THE ENGINEERING AND MINING JOURNAL.

VOL. XVI.—No. 26.—FOURTH SERIES. NEW YORK, TUESDAY, DECEMBER 23, 1873. PRICE 10 CENTS PER COPY.

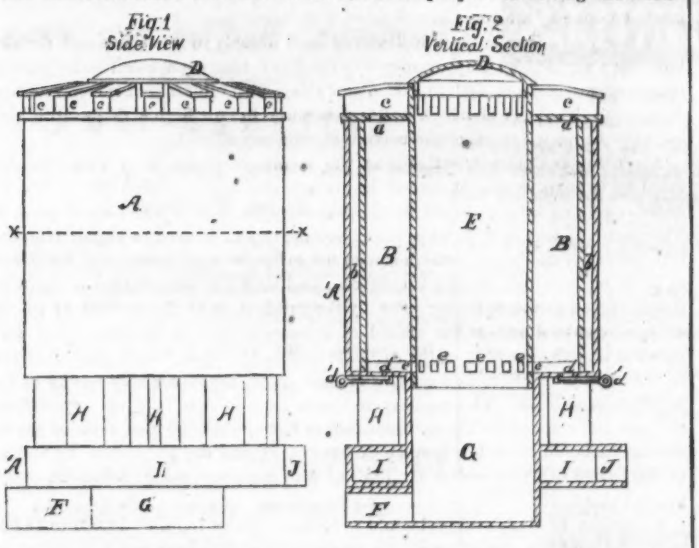
The Wilson Process for Making Wrought-Iron Direct from the Ore.

By EDWARD M. GRANT, C. E.

THE repeated attempts to manufacture wrought-iron direct from the ore are so well known that it is useless to recount the history of past inventions, and, therefore, I will proceed directly to a description of the process which I have investigated.

This furnace was invented and patented by Mr. JOEL WILSON of Dover, New Jersey, who has spent his whole life in the iron business, in England and America, and has been working on this process for nearly twenty years. His last patent was taken out in July 1872; and his furnace has been in operation a portion of the time during the last twelve months. The stoppages have been caused by changes made at various times in the puddling furnaces, to adapt them to this process; several hundred tons of iron have been made by this method during that time and sold in the New York market.

I first heard of this invention in August 1872, and in December, I came north for the purpose of making a thorough investigation of its merits. I brought several tons of hematite ore from Alabama, for the purpose of testing the work-



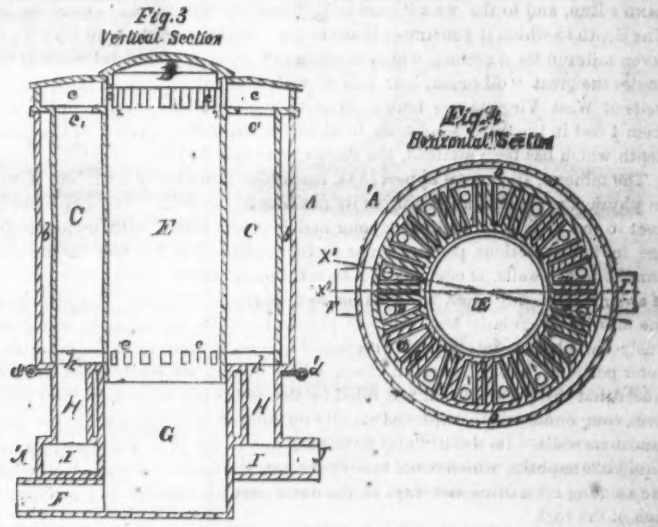
ing of our native ores by this process. I became so much interested in the matter, that I remained in the vicinity of the works until September 1873, when they were closed in consequence of the panic. During this time, I weighed nearly all the ore and coal used in the furnace, and kept complete records of the yield in muck-bar from each retort, as well as the amount of coal used in puddling, time of heats, etc. I also preserved samples of muck-bar from the various charges of ores, to test the uniformity in quality of the iron produced.

The accompanying diagrams will assist an explanation of the apparatus. The ore is crushed to the size of small shot, and mixed with the proper percentage of powdered coal, and then charged in the retorts, B, through the appertures, *a a*. These retorts are built of fire brick or tile, and dovetailed together in such a manner as to hold them firmly in position. They contain from 1,300 to 2,000 lb. of ore, according to the comparative weight and bulk of the mineral. The heat employed is produced from the gases escaping from two or more puddling furnaces, which are conducted from said furnaces through the flues, F, into a collecting chamber, G, whence the gases ascend to the level of the base of the retorts at *d d*. Here part of the heat passes under the retorts through the small flues, *h h*, into the annular space, *b b*; thence up to the top of the furnace, where they are conducted through the conduits, *c, c, c*, into the intermediate flues, C', C', C', and thence downward. The major part of the gases rises up through the central chamber, E, to the cap, D, thence through the conduits, *c c c*, and down through the flues, C C, uniting therein with the portion of the gases that went up the annular space, *b b*; thence down through the stand flues, H H, into the circular collecting flue, I I, which conducts the escape heat to the stack.

In this way the gases pass entirely around the retorts, heating them from the outside, while the ore is completely protected from the action of the puddling furnace gases.

After the ore in the retorts has been reduced by the action of the carbon mixed with it, and thereby freed from its oxygen, the metallic iron, in the shape of red hot particles (which flow freely, like fine gravel,) is taken out at the bottom of the retorts through the apertures *d d*, (covered by the slides, *d' d'*) and received into an air-tight vessel, of my own design, (thus protecting the ore from oxidation from the atmosphere) and is there transferred to a hopper, opening into the puddling furnace, whence it is charged upon the hearth beneath, without losing the heat absorbed in the reducing furnace.

This reducing furnace contains sixteen of these retorts, twelve feet high, arranged in a circle about the central chamber, E; the tiles forming the retorts are two inches thick and twelve inches in height; all parts of the furnace exposed to the action of the products of combustion are constructed of fire brick or cast iron lined with fire clay. The central chamber, E, is seven feet in diameter, and this size of the passage prevents any cutting away of the brick work by the flame, and also produces an even distribution of the gases through the intermediate flue sys-



tem, C C C. The heat which escapes from the flue, J, leading to the stack, is sufficient to raise steam for blast and rolling machinery. One of these reducing furnaces will supply three puddling furnaces with reduced ore, so as to keep them in constant operation, and the escape gases from *two* of these furnaces will furnish all the heat required to deoxidize the ore.

The construction of the puddling furnaces is based upon the same general principle as that adopted in ordinary bar mills; they are lengthened out, however, so as to form three bottoms, about the ordinary size; the first, next to the flue, is inclined, and upon this hearth the ore is charged; it is thoroughly heated up here, and is then moved forward upon the second hearth, by a tool designed for the purpose, where it is heated sufficiently to melt the slag produced by the fusion of the impurities of the ore; from there it is moved to the third bottom and balled up. The operation is continuous, as a second charge is placed upon the first bottom as soon as the first one is moved to the second hearth. The puddling involves less muscular exertion than that required for working pig iron, and only requires one laborer in addition to the usual puddler and helper employed in the ordinary furnace, and the yield from the puddling furnace is fully equal to the production of similar furnaces in using pig metal.

The operations of hammering or squeezing, rolling, etc., are, of course, the same as in the ordinary working of pig iron blooms. A ton of finished iron can be made with two tons of coal, including that used for reducing purposes. The cost of these reducing furnaces is a small item, and they can be erected in any rolling mill, and the puddling furnaces modified as described, and thus render the mill owners independent of the blast furnaces.

The yield in muck bar from the ore is about the same in amount as that ob-

tained at the blast furnace in the shape of pig iron. The Alabama ore assayed 54 per cent., and I obtained 47 per cent. of muck bar. Seven tons of ore sent me from Georgia assayed about 50 per cent., (being surface ore) and yielded 45 per cent. Spanish ore from Bilboa, assaying 48½ per cent., yielded 45 per cent., and many ores from New Jersey and adjacent States yielded to within two to five per cent. of the assay. Magnetic and hematite ores were worked with equal facility, and they were mixed together in various proportions, fully demonstrating that mixtures of ores could be worked so as to produce any kind or quality of iron desired.

The muck bar showed a uniform fracture both in color and texture, and there is no question about this process producing a quality of iron equal, if not superior, to any produced from the same ores by the old process. The degree of heat employed in the reducing furnace is not sufficient to produce any visible effect upon the bricks, and, therefore, they will endure a long period of service. The furnace is surrounded by a casing of tank iron, with a fire brick lining between the iron and the annular space *b b*.

Ores containing an excess of impurities may be fluxed in the puddling furnace with perfect facility.

During my investigations, every facility was afforded me by the proprietors of the works, and, for a good portion of the time, the operations were practically under my own direction, the inventor following my suggestions so that I might have every point tested in my own way, and to any extent I deemed necessary. My conclusions were so favorable, that we should have had our works in the South upon this plan, well under way by this time, but for the unexpected stringency in the financial world, which has, of course, postponed all new enterprises.

West Virginia Asphaltum,

Or grahamite, is a species of mineral pitch, which has the following composition: Specific gravity, 1·145; carbon, 76·45; hydrogen, 7·83; oxygen, 13·46; ash, 2·26. Traces of sulphur and n (WURTZ). It is used extensively as a gas enricher. This peculiar mineral is found as a true fissure vein cutting vertically through the sandstones and shales which constitute the "Upper Barren Measures," which lie above the Pittsburgh coal bed. These measures are here nearly horizontal, and the fissure which contains the grahamite does not appear to have a length on the strike of much over a mile. It ends quite abruptly on the east at MCFARLAND'S Run, and to the west it gradually thins out till it is no longer workable. The depth to which it penetrates is unknown. If this vein were continued about seven miles in its direction, which is north 12° west, it would intersect at right angles the great "oil break," or line of upheaval, along which the petroleum wells of West Virginia are found. The vein of grahamite varies in thickness from 4 feet in the hard sandstone to 2½ feet in the softer shales; at the greatest depth which has been attained, the thickness is only 2¼ feet.

The mineral, in general appearance, resembles bituminous coal, but it varies in physical properties according to its position in the vein. The outer portions next to the walls have a jet black color and brilliant lustre, with eminent cleavage in two directions perpendicular to the walls. The fracture in the plane, parallel to the walls, is conchoidal; streak nearly black. The inner portion is of a dark, steel-gray color, resinous lustre in part—in part dull. Its structure in the mass is irregularly and coarsely prismatic, while its intimate structure is finely flat fibrous, intermixed with small plates, similar in appearance to the outer portion. Prof. FONTAINE, from whose report we glean these facts, considers that this peculiar vein was filled by the inflowing of a semi-fluid bituminous compound, which hardened rapidly on coming in contact with the porous sandstone walls. Its fluidity may have been due to the presence of a vaporizable liquid like naphtha, which could easily penetrate the sandstone walls, thus causing the seeming crystalline structure of the outer portions and the lack of discoloration of the rock.

Grahamite yields theoretically 140 gallons of oil per ton; practically, about 100 gallons may be obtained. The fine dust produced by handling the mineral is capable, when very dry, of inflaming from an open lamp. This has led to two accidents from explosion; the dry dust having caught fire in the lower levels, the gaseous products became mixed with air in the upper works and exploded.

Safety in Noxious Gases.

THE Inspectors of Mines have arranged for a series of experiments, which are to commence in a few days, for the purpose of testing the practical value of a French invention known as the acrophane, or the Denayrouze mining apparatus, which has already been practically tested in various mines in Saarbruck, Montpellier, Arras, Brassac, Blanzy, Bruay, Epinac, Creuzot, and in a number of other places in Germany, France, Belgium, and Sardinia. The first experiments in England are to be made in some of the mines at Wigan early next week. The principle upon which this invention is based has been known for some years, but it is claimed that it has been brought to perfection within a comparatively recent period. It is said to solve the problem both of breathing and of affording light in the midst of the most noxious gases. By its aid, and encumbered with no more than 8 or 10 lb. weight of apparatus, a man may penetrate at once and to a great distance, into a pit filled with choke-damp or with smoke, or with any gas of whatever nature or density, remain there for several hours, carry a lamp with him without danger, and have free use of his arms. It seems simple and plain enough, but the series of experiments which are now to be made in our own mines will probably be more satisfactory to our own mine-owners. If the invention really accomplishes what is claimed for it, there can be no doubt that its adoption here would save a vast amount of property, and often many lives.—*London Mining Journal.*

Coal-Cutting Machinery.

MR. WM. CLAPP, of the NantyGlo Ironworks, has patented some improvements in machinery and apparatus for cutting coal and for other similar purposes, and in the mode or method of using and working the same. A number of cutters, drills, or augurs, mounted in a frame, are made to traverse and angle according to the work within, or between, upright standards, or a vertical or other frame. The cutting instruments are caused to rotate together in the same or in opposite directions, and are connected together by wheels or wheel and pinion gearing, and worked by hand from one crank handle, or by power from a pulley and chain wheel, or by a crank from the motor. The instruments are of different lengths, as, for instance, the center cutter should be the longest, and the next on each side shorter, and so on. Where spiral augurs or boring-tools are used, and the wheel gearing is continuous, they are alternated right and left in their pitch. For cutting away the divisions of stuff left between the bore-holes, and also for working out grooves or slots in the coal, two circular saws are placed side by side, and each having a long eye with internal teeth, the end of the arm or lever has a cross tail-piece, upon each end of which is fitted a pinion taking into the teeth of the internal wheel in the eye of each saw, so that when by means of the lever arm it is forced forward to and fro, the coal is cut away, and a slit or groove made according to the distance apart of the two saws.

The Value and Limits of the Hot Blast.

IN *Berg- und Hüttenmännisches Jahrbuch der K. K. Bergakademien zu Leoben und Przibram, etc.*, Vol. XXI., No. 4, the widely known metallurgist, P. v. TUNNER, has published an article on the above subject, of which the following is a condensed version, as published in a late number of the *Berg- und Hüttenmännische Zeilung.*

The heating of the blast up to 150 to 300 deg. C., as practiced heretofore, has resulted in a saving of fuel of from 15 to 30 per cent., and in some cases even of more. At first there was produced, in consequence of the increased temperature in the hearth, an iron richer in silicon than before, and its occurrence could not in all cases be avoided by an increase of the ore-charge; but it was found that it could be done by adding a larger amount of limestone.

Of late years, iron masters in England, and notably in the Cleveland district, have been enabled by improvements in the blast heating apparatus, to produce temperatures of from 500 to 800 deg. Centigrade. But a controversy ensued very soon, the object of which was to determine to how high a degree the blast ought to be heated to effect the maximum economy of fuel.

According to BELL'S investigations, the results of which have been corroborated by the experiences at several English works, highly heated air of 800 degrees causes no saving of fuel in comparison with that of 400—500 degrees C. The reason of this is that, when air of 800 degrees C. is used, a higher temperature results in the hearth, which causes the carbonic acid, remaining indifferent at lower temperature, to take up carbon; and thus the temperature is again reduced as well in the reducing zone by the gasification of the carbon as in the zone of combustion by the arrival of a less quantity of carbon. The final result is that the quantity of the carbonic acid in the tunnel-head gases decreases in the same proportion, as a surplus of heat enters the furnace by means of the highly heated blast. The capacity of the furnace-gases to take up oxygen from the ores has reached its limits, according to BELL, when 30 per cent. of the reducing carbonic oxide has become carbonic acid, and the proportion by volume of 100 CO:40 CO_2 is therefore the limit of economy, because all reduction ceases beyond this limit.

According to BELL'S experiments a furnace 80 feet high, of 12,000 to 16,000 cubic feet contents, furnishes all the economic results, which can be reached by the size of the furnace, as thus the highest limit of the cooling and saturation with oxygen of the gases is reached. With a still larger increase in size of the furnace, the production of iron does not grow correspondingly. Contrary to the common supposition, BELL found that during the reduction of the iron ores an evolution of heat took place in the reducing zone, in the upper portion of the furnace. VON TUNNER doubts the above proportion by volume, 100CO : 40CO_2, as the extreme limit; and by means of analyses of furnace-gases and calorimetric calculations, comes to the following conclusions:

a. In the blast-furnaces of Styria, which are run with charcoal and easily reducible iron ores, the quantity of carbonic acid may be increased to 60 vol. per 100 vol. carbonic oxide, and there is good reason to expect, that, where in making white iron with a temperature of the blast of 200—300 degrees the carbonic acid in the gases does not reach this proportion, a higher heating of the blast will be economically advantageous, without causing deterioration of the quality of the iron, providing the latter is not brought about by cold working.

b. In accord with BELL he finds, that in making white iron a heating of the blast above 300 degrees does not result in a saving of fuel.

c. Such a saving takes place however, when gray iron, for instance that used for the Bessemer process, is made. The reason for this is to be found not only in the greater consumption of coal, inherent to the manufacture of such iron, by which there is evidently a surplus of carbonic oxide generated, but also in the relatively higher temperature in the lower, and less high in the upper portions of the furnace, in comparison with cold or slightly heated blast. In the lower part

of the furnace there must be a higher temperature, when hot air is used, than with cold blast, because in the former case the same quantity of heat is contained in a smaller volume of gas; and in the upper portions there must be less heat, because with the smaller volume of gas and at the same time a larger quantity of charge, the absorption of heat must be quicker and more perfect. When hot blast is used, the walls are usually burned out more in the lower part of the furnace, than when cold air is employed. At Neuberg 77—78 lb. of coal were used per 100 lb. of white iron, the blast being heated to 200 degrees and 44—45 per cent. of iron being produced from the charge; to make gray iron, 115—120 lb. were used; now, the temperature of the blast being 500 degrees, 95—100 lb. of coal are used to make 100 lb. of Bessemer iron. At Heft, with a temperature of the blast of 200 degrees, 100 lb. of coal are used for 100 lb. of Bessemer iron, with a temperature of 350 to 400 degrees, only 85—90 lb. In the manufacture of white iron, at Treibach only 63—70 lb. of coal are used for 100 lb. of white iron the blast being heated to 160—to 200 degrees, and the production from the charge being 50—54 per cent. of metal. This quantity was probably not lessened by heating the blast to 500 degrees; but the iron deteriorated, because the ore charge was much increased to avoid the production of gray iron on account of the high temperature, and thus the reduction was no longer perfect, and "boiling slag" was produced in the hearth, which mixed with the iron. BELL in his *Investigations* has not given separate consideration to the manufacture of gray and white iron.

At some works in Styria, which make white iron, large blast heating apparatus (WHITWELL'S) have lately been built. This is not opposed to the objects in view only because the hot blast oven may be used at times for the regulation of the furnace, and because the brick ovens last longer than the common ones; and furthermore, because with the continually increasing demand for Bessemer cast-iron, the manufacture of white iron will be materially lessened in the nearest future.

E.

Lake Champlain Furnaces.

I WILL begin with those of the Bay State Iron Company, which are located on the Lake shores, at the extreme northern end of the village, in close proximity to the steam-boat landing and the line, not yet finished, of the New York and Canada Railroad. The company has two remarkably fine furnaces, though they have been in blast some years. They make on an average 200 tons each of the highest grades of anthracite pig-iron per week. They can make, and have made, as much as 300 tons each per week. A large portion of the ore used comes from the Cheever bed, in which, as I have before said, some members of the company are stockholders, and in which the general company has a mining right to a portion of the ore on payment of a royalty of fifty cents per ton, in addition to the cost of mining. All the arrangements in and around the furnaces are most excellent. The boshes are 16 feet in diameter and the stacks 60 feet high, and the works give employment to some 250 men and boys. All the ore and coal is dumped from the trestle-work close by the furnaces, and a small branch track carries the pig-metal to the wharf, for loading for water transportation or to the railroad, by means of which it reaches the East, via Ticonderago and Rutland. Nearly all the pig-iron made at these furnaces is shipped to the Eastern States. The company also have a small foundry, in which they make their own castings and help their neighbors when necessary. They have lately made some castings for the new Cedar Point furnaces, at Port Henry. But they do not go generally into the foundry business. They regard their foundry as a mere accessory to their blast furnaces.

The Fletcherville blast furnace is up in the mountains, about a mile and a half in a northeasterly direction from the great ore bed at Meadville. It is owned by Messrs S. H. and J. G. WITHERBEE and Mr. FLETCHER. For some time it has been a sort of pet of Mr. THOMAS F. WITHERBEE, a younger brother, who has had sole charge of it, and has experimented with it till he has pretty nearly solved the question of how to obtain the greatest amount of pig metal with the least possible consumption of fuel. The furnace, a charcoal one, is a little peculiar to look at, and is closed all round with masonry; but appearences are sometimes deceitful—certainly so in this case, for the furnace does more than earn its bread and butter. The furnace first went into blast in August, 1865, the stack then being 42 feet high, and the diameter of the bosh 11 feet. In those days the daily production of pig-iron was about six and a half tons, the consumption of charcoal 223 bushels per ton of iron, and the heat of the blast about 500°. By enlarging the stack and tunnel head, putting in fresh tuyeres, and carefully noting the results of different changings, things soon began to improve. One innovation was made after another, not the least important being the introduction of cinder into the charge. Mr. WITHERBEE'S aim was to produce first-class pig-iron suitable for Bessemer steel. Indeed, it was at this furnace that the pig-iron was made from which JOHN A GRISWOLD made his first run of Bessemer steel at his works in Troy. With this end in view, Mr. WITHERBEE had long sought a combination of materials to work in connection with the New bed pure ore; but while the ore itself was suitable, the lean ore, clay, and limestone used with it to form a cinder invariably added more than the allowable amount of phosphorus to the iron. Knowing that blast furnace cinder rarely contains more than 8. per cent. of phosphoric acid—for all practical purposes far from it—it was decided to use this cinder as a mechanical element of the charge, providing for the small percentage of silicious matter in the ore—from two to four per cent.—by the addition of sufficient limestone to form a bi-silicate cinder. The charge then was in the following proportions: Charcoal, 40 bushels; wood, 15 bushels; ore, 1,050 pounds; limestone, 60 pounds, and old cinder, 260 pounds. With the many alterations in the furnace itself, this charge was very successful in its results, and the same proportions are still used. While the consumption of fuel was decreasing, the temperature of the blast was increasing, till it has now reached an average of 900°, and can be maintained at 1,000°, the consumption of charcoal being reduced to eighty-three bushels per ton of iron, and the production of pig raised to fifteen tons a day.

At the southern extremity of Port Henry a blast furnace is being put up by the Cedar Point Iron Company, on which, it is no exaggeration to say, the attention of iron-masters throughout the country will be concentrated, so soon as it is "blown in," which will be in the course of a few weeks. The great point of attraction consists in the fact that the furnace will be the first to go into blast in this country, which is provided with the new Whitwell hot-blast fire-brick stoves. Indeed, I rather think that it was a conviction of the great merits of these stoves that led to the formation of the company, which includes Messrs. WITHERBEES, SHERMAN & Co., Mr. DELAMATER, of New York; Mr. WALDO, an old and prominent resident of Port Henry; Hon. FRANKLIN W. TOBEY, and others. The furnace is now so rapidly approaching completion that one can easily see the mode of applying these stoves and their advantages. Their leading feature is in the largely increased temperature of the blast which they can withstand, and the consequent decrease in the quantity of fuel consumed in running the furnaces to which they are attached, amounting to several hundredweights per ton of iron made. I believe I am correct in saying that the greatest temperature which can be got through metal pipes without danger of the metal giving way is about 1,200° or 1,300°. These stoves will sustain a temperature of 2,000° without risk of damage. The operation seems to me a very simple one. An iron casing incloses a circular fire-brick chamber, 22 feet in diameter and 29½ feet high. This chamber has nine thick fire-brick partitions which do not reach to the roof. It has four principal valves—the hot-blast valve, the cold blast chimney and the gas-valves, and smaller valves for the admission of hot air. The hot and cold blast valves being closed, the gas-valve is opened and the gas enters the stove and traverses up and down the spaces between the fire-brick partitions before entering the chimney. Heated air is admitted through the air-valves, and, mixing with the gas, a most intense combustion is obtained which heats the stove up to an exceedingly high temperature, the great surface of fire-brick, presenting a heating surface of 11,500 square feet, becoming red-hot. The chimney-valve and gas-valve being closed, the cold blast valve is opened, the blast rushes in, and by the time it issues through the hot blast valve it is red-hot. Two more of these stoves can be attached to the same furnace. At present, nineteen furnaces, in Great Britain, France, and Luxembourg, have been fitted with fifty-eight of these stoves; thirty-nine furnaces, with 151 stoves, are now being constructed, of which seven furnaces and twenty-five stoves are in this country. They are located as follows:

	Furnaces.	Stoves.
Cedar Point Iron Company, Port Henry, N. Y.	1	4
Boyle, Ditmans & Jervois, Georgia	1	3
Herford Furnace, Maryland	1	2
Etna Furnace, Ohio	2	8
Mercer Iron Company, St. Louis, Mo.	2	8
Total	7	25

Of the furnaces building in this country, the Cedar Point will be the first to go in blast. Should it prove to be a success, as there is every reason to anticipate, there is no doubt that the Whitwell stoves will come into general use. Many are only waiting to see the results at Cedar Point to adapt them to their own furnaces at once.

But this Cedar Point furnace is intended in every way to be the perfection of a blast furnace. No expense has been spared in its construction. Though there are larger furnaces, (the production of the Cedar Point will be about forty tons a day), in the country, I do not think there is one of such costly construction—$450,000. As soon as this one is finished a sister furnace will be commenced at once. I append a description of it, furnished me by Mr. THOMAS F. WITHERBEE, from whose design, and under whose superintendence, the furnace has been constructed.

Stack—Iron shell 27 feet in diameter by 58 feet high, resting on six cast-iron columns, each 12 feet long, making total height of stack 70 feet. Boshes—16 feet diameter; angle, 71°. Diameter of stack at top under bell and hopper, 13½ feet. Elevator consists of one pneumatic hoist, 36-inch cylinder, built by Delamater Iron Works, New York. Platform of hoist capable of lifting four barrows at a time, and a weight of 3½ tons if required. In addition to blast from main engine, the hoist is furnished with a KNOWLES direct-acting air-pump, 14-inch steam, 30-inch blowing cylinder by 36-inch stroke, to be used when main engine is not running, and also during extremely cold weather, when the pneumatic cylinder might possibly freeze up, if using air from main engine containing more or less moisture. Air-pump to be located where it will find cold and consequently dry air.

Casting-house—60 feet by 69 feet, of bricks; galvanized iron roof; walls 21 feet high.

Scale-house—26 feet by 26 feet inside; iron roof.

Hot Blast—Four Whitwell fire-brick stoves, 22 feet diameter by 29½ feet high; heating furnace of each stove 11,500 square feet.

Top-house—Built by DELAMATER, New York; iron, supported by the cylinder of pneumatic hoist.

Bell and hopper—Diameter of bell 7½ feet, worked by an air-cylinder 26 inches in diameter.

Engine hoist—60 feet by 66 feet, of bricks; height from basement to eaves, 48 feet. In basement are located one KNOWLES pump, 10-inch steam, and 5-inch water-cylinders, by 12-inch stroke; one KNOWLES pump, 10-inch steam, and 6-inch water cylinders, by 18-inch stroke, to feed the boilers. The latter pump is a mining pump, having a plunger working into two single-acting pumps, instead of a piston in one water cylinder. In basement are also placed two KNOWLES pumps for pumping water into a tank for general furnace use. Steam cylinders are 24 inches diameter; water cylinders, 16 inches; stroke, 24 inches.

Blowing engine—Built by HENRY G. MORRIS, Philadelphia. Steam cylinder, 60 inches diameter by 8 feet stroke; blowing cylinder, 100 inches diameter by 8 feet stroke. The engine is known as a side-lever engine. Weight of some of the principal parts of engine: Levers, each 11 tons; blowing cylinder, 9½ tons; fly wheels, 22 tons each; steam cylinder, 7½ tons; cross-heads of Bessemer steel, 2¼ tons each, (the largest steel forgings ever made in this country); diameter main shaft, 18 inches; diameter beam center, 18 inches; total weight of engine, 180 gross tons.

Boilers—Built by THOMAS S. SUTHERLAND, Franklin Iron Works, Troy, N.Y., who also furnish all the wrought-iron work for stack, stoves, steam-pipes, water-tank, chimneys, &c. Number of boilers, 8, set two and two, each two connected by mud-drains of same diameter of boilers, and 10½ feet long. Diameters of boilers—55 feet long by 5 feet diameter; shell, ⅝ inch thick; heads, ½ inch thick; iron, Bay State, "C," 1 inch.

Boiler chimney—Of wrought-iron, 8 feet 7½ inches at bottom, 6 feet at top, and 114 feet 9 inches high, built with fire-bricks.

Hot blast chimney—Same as boiler chimney.

Fuel used will be anthracite coal.

Lake Champlain magnetic ore will be used.

The National Academy of Sciences.

THE publication of college papers is one of the practical features of modern college life, and must be looked upon as a very important step in the right direction. Sometimes we see papers which confine their attention too strictly to fun making, but, as a rule, the value of the college newspaper as a training ground and debating field is recognized, and the students endeavor to improve it. One of the better class of these papers is *Acta Columbiana*, which has replaced *Cap and Gown*, the former college paper. It begins with an interesting article on the history of the college, and contains, besides discussions on the attempt of several ladies to obtain admittance to the college course, accounts of some of the societies formed by the students, and similar matter personal to the college, the following account of the National Academy of Sciences.

This body of eminent men is accustomed to pursue the even tenor of its way with so little ostentation or flourish of trumpets, that its origin, objects and history are very little known to the general public. The following particulars, which we have gathered from an authentic source, will probably have some interest for our readers.

The National Academy of Sciences was created by Act of Congress of the United States, approved March 3, 1863, to serve as an authoritative adviser of the Government upon all questions relating to science. The words of the Act imposing this duty are the following: "The Academy shall, whenever called upon by any department of the Government, investigate, examine, experiment and report upon any subject of science or art, the actual expense of such investigations, examinations, experiments and reports to be paid from appropriations which may be made for that purpose; but the Academy shall receive no compensation whatever for any services to the Government of the United States." Practically, therefore, this body occupies the same position as to scientific precedence in this country, as the Academy of Sciences of Paris, and the Royal Society of London, in France and Great Britain respectively.

Many questions, among them some involving very laborious investigations, have been examined and reported on from time to time by Committees of the Academy, on the requisition of the several departments of the Executive Government, particularly the Departments of War, the Navy and the Treasury. Among them may be mentioned an inquiry into "the best means of improving the navigation of the river and harbor of San Juan del Norte, in Nicaragua," with a view of establishing a satisfactory inter-oceanic line of communication by that route. (This was before the opening of the trans-continental railroad.) Also inquiries into "the galvanic action arising from the association of zinc and iron;" into "magnetic deviations in iron ships;" into "the best means of testing the strength of distilled spirits;" into "the merits of various schemes submitted to the Treasury by inventors, for the protection of the paper currency against counterfeits," and many others.

Besides the reports to the Government, the Academy has made very numerous contributions to the advancement of science by the independent labors of its members, most of which have been published in scientific journals after having been read in the meetings; the pecuniary means at the command of the body not having sufficed to enable it to publish its own proceedings regularly in separate form. One volume, was, however, published at the expense of the Government.

By the Act of Charter, the number of the members of the Academy was limited to fifty. On its own application this limitation was removed in 1871. The original corporators were named in the charter itself.

Of the original members fourteen have been since removed by death, and five, at their own request, have been placed on the list of honorary members. The honorary members are ALEXIS CASWELL, GEORGE ENGELMANN, ASA GRAY, JOSEPH LEEDY, and M. F. LANGSTRETH; to whom are to be added JAS. P. KIRTLAND, a member since elected. One of the original corporators declined the nomination, and one other ceased to attend after the first meeting, and was dropped from the roll. There are now therefore only twenty-nine active members belonging to the original list.

There have been added to the Academy by election, during the past ten years, fifty-three members, of whom six have died since their election, and one has been retired into the honorary list. There remain, therefore, of this number, forty-six active members, who, added to the twenty-nine original corporators, make the present total to be seventy-five. By a provision of the Constitution only ten additional members can be elected annually.

There have been also elected, since the foundation of the Academy, eleven foreign associates, of whom four, viz.: Sir WM. ROWAN HAMILTON, MICHAEL FARADAY, Sir DAVID BREWSTER, and Prof. G. A. A. PLANA have died since their election.

The Academy holds two *stated* meetings annually, one of which must be held in Washington, for the other, the place is fixed by the Council. Scientific sessions may be called at any time and place, by a majority of the Council. The Council itself is a body composed of the officers of the Academy, and six other members elected for that purpose.

The Harlem Boiler Explosion.

THE coroner's jury engaged in trying the case of the Harlem boiler explosion, finished its labors some time ago, a majority of the jury finding that the accident was due, first, to defective construction of the boiler; second, to criminal neglect on the part of Messrs. BEMER & COYNE, sub-contractors, and JOHN BARNUM, engineer in charge of the boiler; and also implicating, in their censure, JOHN BALMORE, the owner, for renting the boiler to Messrs. BEMER & COYNE without having it properly tested in accordance with the requirements of the law; A. L. CAMERON & Co., for selling such a defective boiler; the Harlem Railroad Company, finally, for their want of care in the protection of life in the management of the Fourth Avenue improvement under the charge of their engineers. The dissenting jurors, four in number, returned the same verdict, with the exception that instead of finding the sub-contractors and the engineer "guilty of criminal neglect," they returned a verdict against them of "carelessness and neglect."

According to the reports in the daily papers, the coroner, in presenting the case to the jury, said that the facts in the present case were simply that JOHN BALMORE purchased a low-price boiler, made in 1866 by a company now defunct, and sold, in 1868, to A. S. CAMERON & Co. After being exposed from that time to all the inclemencies of the weather, this boiler, untested and in an unsafe condition, was placed in operation on the Fourth Avenue. BEMER & COYNE, the sub-contractors, hired this boiler from BALMORE, and put it in charge of JOHN BARNUM, whose qualifications as an engineer they failed to ascertain, and who, in addition to being frequently intoxicated and unfit for any duty, was supposed to run a second boiler over two blocks distant from the first one, which latter, as a consequence, was frequently left in charge of a carpenter and a careless and ignorant boy, thirteen years old. Neither BALMORE nor the sub-contractors could excuse their conduct or in any way or shirk the responsibility.

In consequence of the above verdict, the contractors have been held to bail in $20,000 each; Mr. A. S. CAMERON in $5,000; and BARNUM, the engineer, in $3,000.

DR. H. CARRINGTON BOLTON of the New York School of Mines, will deliver a lecture on the Chemistry of Carbon, at Library Hall, Elizabeth, N. J., December 30, at 8 P. M. Dr. BOLTON will be assisted by Mr. P. de P. RICKETTS, also of the School of Mines, and by Mr. LEWIS H. LANDY, and will illustrate his lecture by brilliant experiments and magic lantern views, the apparatus for this purpose having been supplied from the collection of Dr. CHANDLER. The proceeds of the lecture will be given to Trinity Church, and there is no doubt that it will be a valuable, as well as entertaining, exposition of the subject. A train will leave for New York, by the New Jersey Central Railroad, shortly after the close of the lecture.

AT last the French Government renders its account of war expenses in 1870–71, and here are the totals: Cost of the war proper, 1,912,045,000f.; provisionment of Paris, 169,518,000f.; aid to families of soldiers and sailors, 50,000,000f.; interest on sums due to Germany, 302,065,000f.; maintenance of German troops, 248,625,000f.; repayment of impositions paid by the Germans, 61,708,000f.; various expenses, such as exchange, arrears of loan, &c., 631,163,000f.; German indemnity, 5,000,000,000f.; losses on taxes and revenue, which have to be replaced from other sources, 364,189,000f.; total, 8,739,318,000f. At 20 cents the franc this is $1,747,863,000 coin.

IRON pyrites may be so perfectly roasted as to retain only from one to two thousandths of sulphur by roasting the ore, after having passed it once through PERRET's roasting furnace, a second time in a part of the same furnace, where there is fresh ore above and below it, which furnishes a high temperature in roasting. At the same time much more air must be given access to the ore, than in the first roasting. From the residue of second roasting a cast-iron can be made, which is fit for use in the rolling mill.—*Polytechn. Centralbl.*, 1873, p. 983.

FROM Brazil, Ind., our correspondent writes us, December 10, that the block coal business is at present extremely dull, all the chief markets are fully stocked, and consequently the demand has fallen off to such an extent that the greater number of mines have ceased operations.

THE COAL TRADE

NEW YORK, Dec. 18, 1873.

The market for all kinds of coal is exceedingly dull, and as a consequence coal is sold at figures considerably below the card prices. On Lehigh this "selling below the market" resolves itself into 25 cents per ton off the Lehigh Board prices. The largest of our Lehigh dealers have been making this concession, though, of course, it is not openly avowed.

On the other kinds of coal a similar reduction, and even a considerably larger one in a few cases, have been made; so that while, nominally, there is no prospect of a reduction in the official prices, yet really the all-potent law of supply and demand is making itself felt, and those who have coal to sell, and do not wish to, or cannot hold it, have to accept a considerable reduction on nominal rates. The Delaware and Raritan Canal closes to-morrow.

The strike of the brakemen on the Lehigh Valley Railroad is still maintained, but new men are being engaged and a few trains are running.

Collections are still somewhat difficult, though there is an evident improvement in general business outside of the coal trade.

The western markets, Buffalo, Chicago, and other points, report the trade dull also, in both bituminous and anthracite. This growing market has taken this year 40 per cent. more anthracite than it did last year.

The details of the sale of the Lehigh Coal and Navigation Company's Wyoming Valley coal lands are not fully arranged, so that it is still inexpedient to publish them. The effect of the sale on the Lehigh Company's stock has been to increase its value from 25–26 to 37—or, say, 11 per cent. A very large amount of the stock changed hands on the first rumor of the sale.

We find in a special telegram to the New York *Times*, under date December 18, from Philadelphia, some insinuations for which we see no ground. It appears to be one of those sensational reports which have but a grain of truth in a bushel of chaff. We annex it for what it is worth:

LABOR AND CAPITAL—MOVEMENTS TO CONTROL THE MARKET—THE MOLLY MAGUIRES.

Special Dispatch to the New York Times.

PHILADELPHIA, Dec. 18.—The leader of the "coal combination," the Philadelphia and Reading Railroad Company, is apparently preparing to make a new movement to control the coal market in this city and New York. Immense quantities of anthracite are being brought from the Middle Coal Fields, and there is a constant passing of heavily loaded trains between the Falls of Schuylkill and Port Richmond. The road between Frankford road and Richmond street is filled with coal trains day and night. On the coal wharves at Port Richmond the anthracite is now being "stacked." The quantity is something near 60,000 tons. Large shipments continue to be made to New York and the New England States, notwithstanding the fact that the market generally is overstocked. It is understood that the combined operators here and in other cities will endeavor to monopolize the Scranton coal sales. What the purpose of the Philadelphia and Reading Company can be in rushing so much coal upon the market is best known to those directly connected with the corporation, but individual dealers look upon the movement as being very suspicious.

Although the suspended collieries in Schuylkill County have renewed operations to a great extent, many of those in the upper Lehigh region at Hazelton and Beaver Meadow, which stopped about the same time as the above, are still idle. As far as can be ascertained, the struggle between the carrying companies, operators, and brakemen and miners is not entirely settled. The operators and colliers of the Lehigh districts meet to-morrow to decide upon the prices to be paid for mining in 1874. It is probable that the "basis" will not be altered from that of the present, which is evidently satisfactory to all parties interested.

Reports have reached this city that the "Mollie Maguires," the organized band of desperadoes who infest the coal regions, taking advantage of the unsettled times, have commenced their depredations. Already a number of unoffending miners have been shot and otherwise maltreated. Incendiary conflagrations are also frequent. Certain parties here are actively engaged in circulating petitions asking for the release of Pat. Haster, "the King of the "Molly Maguires," who is at present imprisoned in the Eastern Penitentiary for inciting the great riot in Shamokin in 1871.

Northern Central Railway, Shamokin Division.

Below is the return of Coal sent over the Shamokin Division of the N. C. R. W., for the 7 days ending Dec. 12, 1873.

	Tons.	Cwt.
East	579 00	
West	8,643 11	9,222 11
Same time last year		6,587 07
Increase		2,635 04
Decrease		.....
Total amount shipped to date		616,468 01
Same time last year		550,071 09
Increase		66,381 12
Decrease		.....

Anthracite Coal Trade for 1872 and 1873.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Dec. 13, 1873, compared with the week ending Dec. 14, 1872.

COMPANIES.	1872. WEEK.	1872. TOTAL.	1873. WEEK.	1873. TOTAL.
Phila & Reading R.R†.	68,844	4,438,044	* 71,799	4,884,363
†Schuylkill Canal	317	839,473	2,003	750,124
‡Lehigh Valley R. R.	54,952	3,115,474	25,486	3,174,661
Lehigh & Sus. R. R.	34,820	1,621,850	46,738	1,947,206
" Canal	..	767,094	..	756,252
Scranton North	13,322	773,287	13,024	903,567
" South	40,412	1,967,470	48,343	2,074,628
Penn. Coal Co., rail	23,713	1,172,101	18,693	1,184,853
" " canal	.. ..	6,241	....	7,927
Del. Hud C Co. Canal.	..	1,344,041	....	1,338,652
" " East	11,916	508,562	15,452	413,173
" " West	8,861	416,136	9,056	502,007
" " South	7,217	370,751	850	169,883
Shamokin	6,587	550,071	9,222	616,453
Trevorton	....	....	....	....
Lykens Valley Coal Co.	....	....	....	....
Wyoming North	....	....	....	....
Wyoming South	....	....	....	....
P. N. Y. C. & R. R. Co.	11,225	603,558	9,949	705,568
Williamstown Co'y	....	.....	....	....
Big Lick Col	....	.....	....	....
Total	264,486	18,644,153	270,815	19,489,146
1872	270,815			18,544,153
Increase				944,993
Decrease	11,671			

* These figures are for the week and fiscal period commencing Nov. 30.

† Less coal transported for Company's use and Bituminous coal.

Bituminous Coal Trade, 1873 and 1873.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Dec. 13, 1873, compared with week ending Dec. 14, 1872.

COMPANIES.	1872. Week.	1872. Year.	1873. Week.	1873. Year.
C. & O. Canal	....	612,537	3,311	641,166
B. & O. R. R.	15,790	1,211,913	26,771	1,441,616
Penn. S. Line	3,078	15,819	3,241	107,511
H. & B. T. R. R.	....	292,704	....	441,015
*Harrisburg & D.	5,090	449,705	4,848	321,613
*L. V. R. R.	....	27,060	189	28,410
P. & N.Y.C. & R. Co.	5,169	346,927	5,023	304,518
Cumberl'd Branch Canal.	....	203,617	.....	137,582
" Railroad	755	26,070	2,831	87,215
Total	29,882	3,186,352	46,214	3,510,646
	....		29,882	3,186,352
Decrease	....			
Increase	....		16,332	324,294

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending Dec. 13, 1873.

	Week. Tons.	Cwt.	Total. Tons.	Cwt.
Anthracite received:				
From Lehigh Valley R. R.	9,525	17	19,077	05
" Lack. & B. R. R.	99	00	286	19
" Pleasant Valley R. R.	....			
" Sul. & Erie R. R.	324	04	819	17
Total	9,949	01	20,184	01
Same time last year	11,224	19	22,569	17
Increase	.....		.....	
Decrease	1,275	18	2,385	16
Distributed:				
To Lehigh Valley R. R.				
To Lack. & B. R. R.				
To S. Central R. R.	1,167	16	2,829	08
To Ithaca & A. R. R.	3,944	13	7,394	01
To Erie R. W. Pockets for shipm't.	2,845	02	5,751	02
To Erie Railway, Watkins direct.	581	10	841	03
To individuals on line of road	607	00	1,686	06
To points at & above Coxton for use of Co.	642	03	1,090	15
To points between Waverley and Elmira	160	12	591	06
Total	9,949	01	20,184	01
Bituminous received from BARCLAY R. R.				
Shipped north from Towanda	4,931	14	9,558	18
Shipped south from Towanda	91	18	91	18
Northern Central R. R.	....			
Total	5,023	12	9,650	16
Same time last year	5,168	18	9,733	02
Increase	....		....	
Decrease	145	06	82	06
Distributed:				
To Erie Railway	4,793	12	9,151	18
To So. Central R. R	138	02	407	00
To Ithaca Valley R. R.	....			
Lehigh Valley, R. R.	74	11	74	11
To individuals on line of Railroad.	17	07	17	07
To points on line of road for use of Company	....			
Total	5,023	12	9,650	16
Grand totals transported:				
Anthracite	9,949	01	20,184	01
Bituminous	5,023	12	9,650	16
Total	14,972	13	29,834	17
Same time last year	16,393	17	32,302	19
Increase	.....		.....	
Decrease	1,421	04	2,468	02

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, Dec. 13, 1873.

	WEEK.	SEASON.
North	27,601 01	2,504,340 11
South	850 01	169,882 10
Total 1873	28,451 02	2,674,223 01
Corresponding time in 1872:		
North and South	61,052 11	2,827,299 17
Total Increase 1872	.....	.....
Total Decrease in 1873	32,601 09	153,076 16

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, Dec. 13, 1873.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEH. VAL. BRANCH.

	Tons.	Cwt.
From St. Clair		10 16
" Port Carbon	4,266	07
" Pottsville	1,624	15
" Schuylkill Haven	42,071	10
" Pine Grove	5,973	15
" Tamaqua	14,499	12
" Harrisburg	4	11
" Dauphin	3,347	19
Total	71,799	03

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	.....	
" Mill Creek "	170	04
" Schuylkill Valley Scales	33	04
" Mt. Carbon	229	16
" Cressona "	1,458	08
" Pine Grove "	.....	
" Tamaqua "	1,503	05
Total	3,393	17

SHIPPED WESTWARD VIA CATAWISSA AND WILLIAMSPORT BRANCH AND NORTHERN CENTRAL RAILROAD.

Via Catawissa & Williamsport Br.	184	12
" N. C. R. R. passing Locust Gap	.....	
" " " Shamokin	3,402	14
" " " Herndon	.....	
Total	3,587	06

SHIPPED WEST OR SOUTH FROM PINE GROVE

Via Schuylkill & Susquehanna R. R.	1,982	19
" Lebanon & Pine Grove Branch	757	13
Total	2,740	12

CONSUMED ON LATERALS.

From Frackville Scales	.....	
" Mill Creek "	603	18
" Schuylkill Valley Scales	147	16
" Mt. Carbon "	664	03
" Cressona "	1,193	02
" Pine Grove "	70	07
" Tamaqua "	1,071	03
Total	3,745	18

LEHIGH AND WYOMING COAL.

Received via Silverbrook Junction, Sent East	6,669	09
" " Cat. & Wpt. Br. Sent West	.....	
" " Rupert, Cat. & Wpt Br.	.....	
" " Allentown R. Penn's Br.	98	10
" " Alburtis, " "	75	15
" " Oreland, G. & N. Br.	544	15
" " Willow Street R. R.	525	09
Total	7,913	10

BITUMINOUS.

From Harrisburg	4,827	18
" Connecting R. R., G. & N. Br.	20	00
" Junction R. R.	.....	
Total	4,847	18

COAL FOR COMPANY'S USE.

Anthracite	6,396	07
Bituminous	217	07
Total	6,603	14

RECAPITULATION.

	Total for Week.	Corresp'g week last year.	Increase and Decrease.
Passing over Main Line and Leh. Val. Branch	71,799 02	68,843 12	i 2,955 10
For Shipment by Canal	3,393 17		i 3,393 17
Shipped Westward via Northern Central R. R.	3,587 06	5,715 07	d 2,128 01
Shipped West or South from Pine Grove	2,740 12	2,059 18	i 680 14
Consumed on Laterals	3745 18	4,712 02	d 966 04
Lehigh and Wyoming Coal	7,913 10	5,236 06	i 2,677 04
Total Anthracite paying freig't	93,180 06	86,567 05	i 6,613 00
Bituminous	4,847 18	5,090 11	d 242 13
Total of all kinds paying freig't	98,028 03	91,657 16	i 6,370 07
Coal for Company's use	6,603 14	7 804 11	d 1,200 17
Total Tonnage for Week	104,631 17	99,462 07	i 5,169 10
Previously this year	81,570 05	99,678 17	d 18,108 12
Total to date	186,202 02	199,141 04	d 12,939 02
SHIPPED BY CANAL.			
From Schuylkill Haven	923 00	198 00	i 725 00
" Port Clinton	1,080 00		i 1,080 00
Total Tonnage per Week	2,003 00	198 00	i 1,805 00
Previously this year	4,324 06	6,396 00	d 2,071 14
Total to date	6,327 06	6,594 00	266 14

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday Dec. 13, and during the year 1873, compared with the corresponding period of 1872.

WEEK.

	C. & O. C'l, Tons. Cwt	B. & O. R. R. Tons. Cwt.	Pa. S. Line Tons. Cwt	Total. Tons. Cwt
1873	3,311 00	26,771 05	3,241 11	33,323 16
1872	.....	15,790 13	3,077 15	18,868 08
Increase	3,311 00	10,980 12	163 16	14,455 08
Decrease	.....	.....	....	

YEAR.

1873	641,166 09	1441166 09	107,511 07	2,190,293 11
1872	612,536 18	1211912 13	15,819 02	1,840,268 13
Increase	28,629 11	229,703 02	91,692 05	350,024 18
Decrease	....	....	....	....

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B. & O. R. R. Co. Tons. Cwt.	Total. Tons. Cwt.
1873	.....	2,831 03	2,831 03
1872	.....	755 10	755 10
Increase	.....	2,075 13	2,075 13
Decrease		.....	.....

YEAR.

1873	137,561 12	87 215 05	224,796 17
1872	203,617 16	26,060 13	229,667 12
Increase		61,145 09	
Decrease	66,036 04		4,890 15

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending Dec. 13, 1873, with Totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	19,993 09	36,949 06
" Hazleton	7,777 15	9,277 01
" Upper Lehigh	93 16	266 14
" Beaver Meadow	4,869 00	6,427 15
" Mahanoy	4,085 18	7,871 00
" Mauch Chunk		
Total	36,820 05	60,731 16
Same time last year	65,407 13	127,856 12
Increase		
Decrease	28,587 08	67,124 16
Forwarded East from Mauch Chunk by rail	25,485 16	35,636 15
Same time last year	54,954 01	107,077 14
Increase		
Decrease	29,468 05	71,440 19

DISTRIBUTED AS FOLLOWS.

Local East of Mauch Chunk	1,160 19	1,669 14
Forwarded East for use L. V. R.	970 14	1,552 15
Delivered to Furnaces and Manufacturing Companies	3,938 13	4,494 03
Delivered to Cat & Fog. R. R.	43 02	111 04
" " East Penn R. R.	103 19	170 06
" " North Pennsylvania Railroad	1,971 14	2,392 18
" " Port Del		
" " East' Amboy Railroad		
" " Morris and Essex Railroad	3,750 02	4,816 10
" " Bel Del Railroad	10,116 18	15,986 07
" " Central Railroad	3,429 15	4,462 18
Delivered at and above Mauch Chunk for use of L. V. R.R.	907 14	1,251 04
To P. & N. Y. R. R.	9,525 17	19,077 05
To Northern Central R. R.		2,353 15
To D. H. & W. R. R.	400 03	664 10
To L. & S. B. R. at Packerton for rail	83 00	112 01
To Individuals at Mauch Chunk	43 11	75 04
To Individuals above Mauch Chunk	374 04	758 18
To L. & S. R. R., at Penn Haven, for railroad		
Do. for canal		102 00
To Lehigh Canal Mauch Chunk		
To Catawissa Railroad		
To L. & B. R.R. at Lack. June		
Total	36,820 05	60,731 16

Report of Coal Transported over the Lehigh Canal

For the week ending Dec. 5, 1873.

REGIONS SHIPPED FROM.	TIDE. tons. ct.	LOCAL. tons, ct.	TL. WEEK tons cwt.	TL. DATE. tons, cwt.
Mauch Chunk Region	192 00		192 00	206639 19
Mauch Chunk Region Hazardville				28,845 16
Beaver Meadow Region				131,534 15
Mahanoy Region		197 00	197 00	20,891 01
Hazleton Region		88 00	88 00	199,891 02
Upper Lehigh Region		95 00	95 00	29,967 04
Wyoming Region				114,259 07
Wyoming Region, Hazardville				4,282 09
Total,	192 00	380 00	572 00	736,251 13
Previously reported	260119 12	4755.0 01	735679 13	
Total to date	260311 12	475040 01	736251 03	
Corresponding week last year	267370 12	4797.3 12	767094 04	
Increase.				
Decrease	27059 00	3783 11	30,842 11	

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR. 1873.	YEAR. 1872.
Consumed on line of Lehigh Canal	285 00		81,395 00	80,903 13
Passed into Morris Canal to Tidal Points			2,613 17	5,081 06
Passed into Morris Canal to Local Points			28,233 05	23,519 17
Passed into Del. & Rar. Canal to Tidal Points	192 00	193 03	257,797 15	282,269 01
Passed into Del & Rar. Canal to Local Points		95 13	13,566 01	14,898 08
Consumed on line Delaware Div. Canal		176 04	39,661 11	47,621 13
Passed through to Bristol	95 00	281 14	312,984 04	312,780 01
	572 00	746 14	736,251 13	767,094 04

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending Dec. 13—Compared with same time last year.

REGION SHIPPED FROM.	TIDE. tons ct.	LOCAL. tons ct.	CANAL. tons ct.	TL. WEEK tons cwt.	TL. DATE tons cwt.
Wyoming	23264 16	10286 17		33551 13	1725786 00
Upper Lehigh	38 04	3499 14		3527 18	180060 13
Beaver Meadow	3248 14	4267 09		7516 03	324435 19
Hazleton	55 00	1380 15		1435 15	237345 07
Mauch Chunk	308 12	12845 03		13151 15	504633 06
Total	26903 06	32279 18		59183 04	2951293 05
Prev'ly reported	1385859 14	890678 03	615572 04	2892110 01	
Total to date	1412763 00	922958 01	615572 04	2951293 05	
Same time 1872	1115072 08	846126 14	488605 15	2449804 17	
Increase	297690 12	76831 07	126966 09	501488 08	
Decrease					

DISTRIBUTION.	WEEK 1873.	WEEK 1872.	YEAR 1873	YEAR 1872.
Forwarded East by Rail to Tidal points	26903 06	22456 10	1412763 00	1115072 08
Forwarded East by Rail to Local points	17362 08	10476 09	436:32 00	422857 11
Forwarded East by Rail use Central Division	1681 16	1679 10	88290 14	75382 07
Forwarded East by Rail use L. & S.	190 17	207 07	11320 05	8537 18
Delivered at and above Mauch Chunk	2169 10	1303 06	80806 13	58820 17
Delivered at Coalport & Hazard for Canal	5909 10		661895 07	532178 18
Delivered to L. V. R. R. at Packerton	989 03	550 18	22527 14	14489 05
Delivered to L. V. R. Rd. at Sugar Notch	2798 18		100121 02	
Delivered to L. & B. R. R.at Plymouth Bridge	4774 06	4774 06	138746 10	222465 13
Total	59183 04	41448 06	2951293 05	2449804 17

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, Dec. 13, 1873.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	13,024 18	203,507 07
Shipped South	48,343 01	2,074,628 09
Total	61,367 19	2,978,135 16
For the Corresponding time last Year :		
Shipped North	13,322 05	773,287 09
Shipped South	40,412 03	1,967,470 06
Total	53,734 08	2,740,757 15
Increase	7,633 11	237,378 01
Decrease		

Lykens Valley Coal Company.

Shipments of coal from Lykens Valley Coal Co., for week ending Dec. 13, 1873.

For week ending Dec. 13, 1873	539 07
Total shipment to date	

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending Dec. 13, 1873.

	1873. WEEK.	1873. YEAR.	1872. WEEK.	1872. YEAR.
By Railway	18,892 19	1,184,842 05	23,712 19	1,172,101 03
" Canal		7,937 11		6,240 18
Total	18,892 19	1,192,780 16	23,712 19	1,178,342 01
Increase, 1873	14,438 15			

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, Dec. 13, 1873.

	WEEK.	SEASON.
By Delaware and Hudson Canal		1,358,052
By Railroad, East	15,452	413,173
" West	9,056	562,407
" South	850	169,863
Total 1873	25,358	2,503,715
Corresponding time in 1872 :		
By Delaware and Hudson Canal		1,394,041
By Railroad, East	11,916	508,562
" West	8,861	416,136
" South	4,217	370,751
Total	27,994	2,689,490
Decrease	186,775	

Prices of Coal by the Cargo.

CORRECTED WEEKLY.

Company Coals.

Dec. 1873.

	L.	Str.	Gra.	Eg.	Sto.	Chest
*Pittston at Newburgh	4 60	4 60	4 70	4 80	5 10	4 50
*Lackawana at Rondout	5 25	5 35	5 45	5 60	5 90	5 25
Wilk'b're at Pt. John'n	5 05	5 15	5 25	5 40	5 70	5 05
Old Co. Lehigh at Pt. John'n	6 00	—	5 85	5 85	5 95	5 20
New York Coal Exchange	5 85	—	5 70	5 70	5 85	5 15
AT PHILADELPHIA.						
Hard White Ash	4 60	4 60	4 70	4 70	5 00	3 95
Free B'rn'g White Ash Coal	4 60	4 60	4 70	4 70	5 00	3 65
Schuylkill Red Ash	— —	— —	4 70	4 85	5 15	3 95
Alaska Red Ash	— —	— —	4 70	4 70	5 00	3 95
Shamokin White Ash	— —	— —	4 80	5 00	5 20	4 10
North Franklin	— —	— —	5 20	5 20	5 10	4 00
Lorberry	— —	— —	5 50	5 50	5 60	4 35
Lykens Valley	— —	— —	— —	6 10	6 10	4 75
SHIPPED FROM ELIZABETHPORT, HOBOKEN AND TRENTON.						
L. C. and N. Co., Newport	— —	— —	5 35	5 50	5 70	5 10
" " Plymouth Red Ash	— —	— —	5 25	5 60	5 80	5 10
" " Room Run	5 85	— —	5 70	5 70	5 95	5 15
Honeybrook Lehigh	5 90	— —	5 80	5 85	5 90	5 20
Fulton, "	6 00	— —	5 85	5 85	5 95	5 20
Scranton	4 85	5 10	5 20	5 55	5 65	5 00

For freights to different points see "Freights."
*To contractors only.

Prices at Baltimore—Dec. 1873.

Wholesale Prices to Trade.

Wilkesbarre, by cars	$6 25@....
Pittston and Plymouth, do	6 00@....
Shamokin Red or White Ash, do	6 00@6 25
*Lykens Valley Red Ash, do	@6 80
By retail, all kinds per ton of 2,240 lbs	7 50@8 50
*George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 85@5 00
West Va. Gas Coal	6 50@7 50
Youghigheny gas f. o. b. at L. Point, nominal	7 50
Kanawha Cannel, coarse	13 00

* Freight to New York $2 15.

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	
Tyrconnel f. o. b.	$7 25

Prices at Georgetown, D.C., and Alexandria, Va.

Dec. 1873.

George's Creek and Cumberland f. o. b. for shipping $4 60@4 75

Prices at Havre de Grace, Md.

Dec. 1873.

Wilkesbarre and other White Ash for Cargoes	$....@....
Lykens Valley	....@....
Shamokin Red or White Ash	....@....

Navigation suspended for the season at this port.

Bituminous Coals (Cumberland).

Georgetown, F.o.b.	$4 60@4 75
Baltimore "	5 00
New York "	— —@7 25
South Amboy "	7 00

Prices of Foreign Coals.

Dec. 1873.

Duty 75 c. per ton.

Corrected weekly by ALFRED PARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Caking	16 00@18 50
" " Cannel	13 00@18 00
" House	20 00@21 00
" Orrel	20 00@— —
Per Ton 2,240 lbs., ex-ship.	
PRICES FROM YARD.	
Liverpool House Orrel, screened	$20 00@22 00
"Cannel, "	22 00@26 00
Per ton 2,000 lbs. delivered.	

Prices of Gas Coals.

Dec. 1873.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N.Y

	Coarse	Slack
Block House, f. o. b. at Cow Bay	$2 75	$1 25
Gowrie	2 25	0 00

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coa.
Pictou nett	$3 00	1 50
Sydney	3 25	1 00
Lingan	2 75	1 00
Caledonia	2 75	1 25

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm : 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale :75 cents per ton of 28 bushels.

AMERICAN.	Nominal qu. Currency.
Westmoreland f. o. b.	$7 00 @9 00
Fairmount Gas Coal Co. of N. Y. "	6 50 @7 00
Despard Coal Co. "	6 50 @7 00
Penn. "	6 50 @7 00
Newburg Orrel Gas "	6 50 @7 00
West Fairmount Gas Coal "	6 50 @7 00
Redbank Cannel, at Pa "	12 00 @0 00
AT PHILADELPHIA	
Westmoreland	7 50 @0 00

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven Lump and St., net, $1 60; Br., Egg and Ch., $1 65; Stove, $1 75 Shipping at Pt. R., 20c., for use at Phil., $2 18 from Pt. Carbon.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 72
C. R. R., N. J., Phillipsburgh to Elizabethport	06
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 23

MAUCH CHUNK TO PORT JOHNSTON.

L. V. R.R., or L. & S. R.R. from M. C. to Phillipsb'g	$0 72
C. R., of N. J., Phillipsburgh to Pt. Johnson	1 06
Shipping expenses	25
Wharfage	10
Total	$2 23

TO HOBOKEN

L. V. R. R., Mauch Chunk to Phillipsburgh	72
Morris & Essex R. R. Phillipsburgh to Hoboken,	6
Shipping expenses	25
Wharfage	00
Total	$2 23

TO SOUTH AMBOY.

L. V. R. R.	84
B. & D. R. R. / Cam. & Am. R. R.	1 06
Shipping Expenses,	33
Total	$2 23

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	84
C. RR. of N. J. Phillipsburgh to Elizabethport	1 06
Shipping expenses	15
Wharfage	20
Total	$2 25

Freights.—Dec. 1873.

	Cumberland. From Georgetown.	Cumberland. From Baltimore.	Anthracite. From Elizabethport, Port Johnson, Weehawken, Hoboken.	Anthracite. From Newburgh.	Anthracite. From Rondout...
TO EASTERN PORTS.					
Amesbury					
Bangor			2 25	2 25	
Bath		2 75			
Boston		2 50	2 25*	2 25	
Bridgeport		2 25	90	90	
Bristol			1 30	1 30	
Cohasset Narrows					
Derby					
Dighton					
East Cambridge					
Fall River		2 35	1 25	1 25	
Hackensack					
Hartford			Ice.	Ice	
Hoboken			45	45	
Jersey City			45	45	
Lynn					
Middletown					
Mystic					
New Bedford		2 35	1 35	1 35	
Newburyport		2 75	2 40	2 40	
New Haven		2 25	90	90	
New London			1 10	1 10	
Newport			1 25	1 25	
New York		2 00	45	45	
Norwalk			90	90	
Norwich			1 25	1 25	
Pawtucket			1 38‡	1 38‡	
Portland		2 50	1 90	1 90	
Portsmouth, N. H		2 75	2 35	2 35	
Providence		2 35	1 25	1 25	
Rockport					
Saco					
Sag Harbor			1 10	1 10	
Salem		2 50	2 25	2 25	
Stamford				90	
Stonington			1 15	1 15	
Taunton			1 75	1 75	
Warren			1 25	1 25	
TO RIVER PORTS					
Albany					
Catskill					
Cockaackie					
Coeyman's					
Cold Spring					
Fishkill					
Haverstraw					
Hudson					
New York vessels					
Nyack					
Poughkeepsie					
Rhinebeck					
Rondout					
Sangerties					
Sing Sing					
Stuyvesant					
Tarrytown					
Troy					
West Point					
Yonkers					

† 3 c. per bridge per ton in addition to freight.
† New Haven rate and towing 25 c. extra per ton
‡ Towing from Providence and return, extra.
|| And Towing.

St. Thomas	$— — Gold
Martinique	— — "
Demerara	— — "
New Orleans	— — "
Mobile	— — "

Canal closed for the Season.

Foreign and Provincial Freight

Dec. 1873.

Foreign.
Newcastle and Ports on Tyne, per keal of 21 1-3 tons £
Liverpool, 5 per cent primage

TO NEW YORK.

Provincial

Sydney	$5 00
Lingan	4 00
Cow Bay	4 00
Port Caledonia	4 00
Little Glace Bay	4 00

TO BOSTON.

Sydney	3 50
Lingan	3 50
Cow Bay	3 50
Port Caledonia	3 50
Little Glace Bay	3 50

TO MONTREAL.

Caledonia .. .. 3 75 gold.

TO CUBA.

Caledonia .. .. 9 50 gold.

MARKET REVIEW.

NEW YORK, Dec. 18 1873.

IRON—Scotch Pig is without movement of note; the demand is light, and confined to parcels to meet the present wants of the Trade, but our quotations are well supported, the stock being light. The present prices of Scotch being considerably above those of American, has helped to turn the attention of the Trade to the latter, the market for which may be called decidedly firmer, while parties concede that the lowest prices have been seen likely to rule for some time to come. There is a growing indisposition to offer stocks, and we understand that the Allentown and Carbon Companies are entirely out of the market at present prices. Other companies are not offering, while few or no contracts are being made for the future. The Poughkeepsie companies have now no stock on hand. There has been considerable movement since our last, comprising 2000 tons Nos. 1 and 2 Hudson, 1000 do. Nos. 1 and 2 Poughkeepsie, 300 do. No. 1 Glendon, 400 No. 1 Lehigh, all on private terms; several hundred tons No. 1 Carbon and Allentown at $35; and 1000 tons Lehigh brands reported for next year's delivery at $35. We now quote No. 1 $34@$35, No. 2 32@33, and Gray Forge $26@30, with an upward tendency. New Rails are without inquiry. Old Rails are in fair inquiry; some 6@700 tons not before reported, were sold on private terms. Scrap is quiet, and may be quoted nominally $38@40 from yard. Manufactured from store continues nominally steady at previous quotations, with a strengthening feeling on the part of manufacturers.

LEAD—Pig is without movement, and quotations are nominally as before, say Foreign 6¾@6¾ cents, and Domestic 6¾ all gold. Bar 9¼ cents, Sheet and Pipe 10¼, and Tin-lined Pipe 16¼, usual discount to the Trade.

COPPER—New Sheathing is steady at 33 cents, and Bolts and Braziers 35. Bronze and Yellow Metal Sheathing 26, and Y. M. Bolts 32, net cash. Ingot has become quiet, and prices have been further shaded a little; the transactions embrace 50 000 lb. Lake at 24 cents, sharp cash; and 150@200 000 lb., in lots, 24¼@24½, cash, in the usual way. For January-February delivery 25 cents is asked.

SPELTER—There is no demand for Foreign, and prices are still entirely nominal. Domestic is also very quiet; Western jobbing at 8 cents currency.

STEEL—There is nothing new to report under this head. Market dull.

REGULUS ANTIMONY—may be quoted 12¾ @13 cents gold, in a jobbing way.

TIN.—Pig has become quiet again, but the advanced prices are supported, though in the absence of business they are rather nominal; we have only to notice the sale of 15 tons English, L. & F., at 26¼ cents. The closing quotations were: Billiton, 28@28¼ cents; Straits, 28½; English L. & F., 26¼; English Refined, 27¼@27½, and Banca, 32; all gold. Plates are less active, but stocks are small, and holders generally display firmness; sales have been made of 1,000 boxes. Charcoal Terne at $9.25; 200 do., S. T. P., $9.75; 250 do., B. C. Coke Terne, $6.50; and 250 do., ½d. X, for January delivery, $10.50, all gold.

ZINC.—Mosselman Sheet is quiet, being held at 8c., gold. Manganese black oxide, 3c., currency; gray peroxide, 6c., currency.

METALS.

NEW YORK, Dec. 18, 1873.

IRON.—Duty: Bars, 1 to 1½ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¾ to 1¾ cents ℔ lb; Pig, $7 ℔ ton; Polished Sheet, 3 cts. ℔ lb; Galvanized 2½; Scrap Cast, $6; Scrap Wrought, $8 per ton. All less 10 per cent. No Bar Iron to pay a less duty than 35 per cent. ad val.

	Store Prices.
Pig, Scotch—Coltness ℔ ton	45 00@47 00
Gartsherrie	— —@48 00
Glengarnock	42 —@43 00
Eglinton	— —@42 —
Pig, American, No. 1	34 00@35 00
Pig, American, No. 2	32 00@33 00
Pig, American, Forge	26 00@30 —
Bar Refined, English and American	— —@— —
Bar Swedes, assorted sizes (gold)	— —@137 50
	Store Prices, Cash.
Bar Swedes, ordinary sizes	162 50@— —
Bar, Swedes, Flow sizes	174 50@— —
Bar, Refined, ¾ to 2 in. rd. & sq. 1 to 6 in. x ¾ to 1 in.	77 50@— —
Bar, Refined, 1¼ to 6 by ¼	82 50@— —
Bar, Refined, 1 & 1¼ by ¼ & 5-16 in	82 50@— —
Large Rounds	82 50@100 00
Scroll	100 00@135 00
Ovals and half-round	105 00@125 00
Band	100 00@— —
Horse Shoe	115 00@— —
Rods, ¾ to 3-16 inch	82 50@130 00
Hoop	117 50@157 50
Nailrod	9 @ 9¼
Sheet, Russia, as to assortment (gold)	17 @ 17½
Sheet, Singles, D. and T. Common	—4½@— 5¾
Sheet, D. and T. Charcoal	—6¾@— 8
Sheet, Galv'd, list 10 per cent. discount	— —@— —
Rails, English (gold), ℔ ton	56 —@60 —
Rails, American, at Works in Pennsylvania, currency	65 —@— —

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 33
Copper Bolts	— @— 35
Copper Braziers, 16oz. and over	— @— 35
Copper Nails	— @— 40
Copper, Old Sheathing, &c. mixed lots	20 @— 23
Copper, Old, for chemical purposes, 14@16 oz.	— @— —
Copper, American Ingot, Cash	24 @— 24¼
Copper English Pig	— @— —
Yellow Metal, New Sheathing & Bronze	— @— 26
Yellow Metal Bolts	32 @— —
Yellow Metal Nails, Sheathing and Slat'g	— @— 26

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb Pipe and Sheet, 2½ cents ℔ lb.

Spanish (gold)	6 75 @6 87½
German, do.	6 75 @6 87½
English do.	6 87½@7 00
Foreign, Refined	7 25 @7 50
Domestic do.	6 00 @6 12½
Bar (net)	9 25 @ —
Pipe (net)	— — @10 50
Sheet	— — @10 50

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under 2½ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 3½ cents ℔ lb, and 10 ℔ cent ad val. Store prices.

English Cast (2d and 1st quality) ℔ lb	— 17 @— 21
English Spring (2d and 1st quality)	— 8½@— 10½
English Blister (2d and 1st quality)	— 14 @— 18½
English Machinery	— 14½@— —
English German (2d an 1lst quality)	— 12½@— 14½
American Blister "Black Diamond"	— — @— 11½
American, Cast, Tool do.	— — @— 17
American, Spring, do.	— — @— 11
American Machinery do.	— 11½@— 12
American German, do	— 9 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent.; Roofing 25. ad val.

	Gold ℔ lb.
Banca	32 @—
Straits	26¼ a 26⅜
English	26¼ @—
English Refined Gold	27¼@27½

PLATES.

Fair to Good Brands.	*Gold.*	*Currency*
I. C. Charcoal, ℔ box	$10 00 @10 50	$11 50 @12 00
I. C. Coke	8 25 @ 9 25	9 50 @10 50
Coke Terne	6 50 @ 8 25	7 50 @ 9 25
Charcoal Terne	9 25 @— —	10 25 @11 25

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb

Plates, Foreign (gold) p. 100 lb.	7 37½@—7 62½
Plates, Domestic p. lb.	8 @—11

ZINC—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2½c. per ℔

Sheet per lb.	—8¾ @ —

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, Dec. 18, 1873.

We have advices from the San Francisco Stock Board dated the 16th inst. Raymond & Ely has declined $10 per share, as compared with our last, being the only exception to a very material advance of the list. The report is as follows:

Savage	—	—	84
Crown Point	—	—	1 2
Yellow Jacket	—	—	84
Kentuck, "New Issue"	—	—	18
Chollar Potosi	—	—	72
Gould & Curry "New Issue"	—	—	28
Belcher "New Issue"	—	—	94
Imperial	—	—	7¾
Raymond & Ely	—	—	50¾
Meadow Valley	—	—	13¾
Eureka C. V.	—	—	18
Ophir	—	—	—
Hale and Norcross	—	—	—

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The ENGINEERING AND MINING JOURNAL, which is the Organ of the Institute, and contains its proceedings, transactions and notices of meetings, will be sent to each Member and Associate on the payment of his annual dues. Back numbers cannot, as a rule, be sent.

II. Dues are payable in advance at the annual (May) meeting. Remittances should be made, as far as possible, by P. O. Order, payable to the Secretary.

THOMAS M. DROWN, Secretary.

1123 Girard street, Philadelphia, Pa.

MISCELLANEOUS.

J. W. PATTEN & CO.,

DEALERS IN

ENGINEERS' AND MINERS'

SUPPLIES,

Machinery, Steam Pumps, &c.,

No. 109 Market Street,

WILKES-BARRE, PA.

SOLE AGENTS FOR "HALL'S SAFES."

Dec. 23-4t

APPLETONS'

AMERICAN CYCLOPÆDIA.

New Revised Edition.

Entirely rewritten by the ablest writers on every subject,

Printed from new type, and illustrated with Several

Thousand Engravings and Maps.

THE work originally published under the title of THE NEW AMERICAN CYCLOPÆDIA was completed in 1863, since which time the wide circulation which it has attained in all parts of the United States, and the signal developments which have taken place in every branch of science, literature, and art, have induced the editors and publishers to submit it to an exact and thorough revision, and to issue a new edition entitled THE AMERICAN CYCLOPÆDIA.

Within the last ten years the progress of discovery in every department of knowledge has made a new work of reference an imperative want.

The movement of political affairs has kept pace with the discoveries of science, and their fruitful application to the industrial and useful arts and the convenience and refinement of social life. Great wars and consequent revolutions have occurred, involving national changes of peculiar moment. The civil war of our own country, which was at its height when the last volume of the old work appeared, has happily been ended, and a new course of commercial and industrial activity has been commenced.

Large accessions to our geographical knowledge have been made by the indefatigable explorers of Africa.

The great political revolutions of the last decade, with the natural result of the lapse of time, have brought into public view a multitude of new men whose names are in every one's mouth, and of whose lives every one is curious to know the particulars. Great battles have been fought and important sieges maintained, of which the details are as yet preserved only in the newspapers or in the transient publications of the day, but which ought now to take their place in permanent and authentic history.

In preparing the present edition for the press, it has accordingly been the aim of the editors to bring down the information to the latest possible dates, and to furnish an accurate account of the most recent discoveries in science, of every fresh production in literature, and of the newest inventions in the practical arts, as well as to give a succinct and original record of the progress of political and historical events.

The work has been begun after long and careful preliminary labor, and with the most ample resources for carrying it on to a successful termination.

None of the original stereotype plates have been used, but every page has been printed on new type, forming in fact a new Cyclopædia, with the same plan and compass as its predecessor, but with a far greater pecuniary expenditure, and with such improvements in its composition as have been suggested by longer experience and enlarged knowledge.

The illustrations which are introduced for the first time in the present edition have been added not for the sake of pictorial effect, but to give greater lucidity and force to the explanations in the text. They embrace all branches of science and of natural history, and depict the most famous and remarkable features of scenery, architecture, and art, as well as the various processes of mechanics and manufactures. Although intended for instruction rather than embellishment, no pains have been spared to insure their artistic excellence; the cost of their execution is enormous, and it is believed they will find a welcome reception as an admirable feature of the Cyclopædia, and worthy of its high character.

This work is sold to Subscribers only, payable on delivery of each volume. It will be completed in sixteen large octavo volumes, each containing about 800 pages, fully illustrated with several thousand Wood Engravings, and with numerous Lithographic Maps.

PRICES AND STYLE OF BINDING.

In extra Cloth, per vol	$5.00
In Library Leather, per vol	6.00
In Half Turkey Morocco, per vol	7.00
In Half Russia, extra gilt, per vol	8.00
In Full Morocco, antique, gilt edges, per vol	10.00
In Full Russia, per vol	10.00

Three volumes now ready. Succeeding volumes, until completion, will be issued once in two months.

***Specimen pages of the AMERICAN CYCLOPÆDIA, showing type, illustrations, etc., will be sent gratis, on application.

FIRST-CLASS CANVASSING AGENTS WANTED.

Address the Publishers,

APPLETON & CO.,

549 & 551 Broadway, N. Y.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.
JOHN A. CHURCH, E. M. Editors.

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.* It is the Organ of the American Institute of Mining Engineers, and is regularly received and read *by all the members and associates* of that large and powerful society, *the only one of the kind in this country.* It is therefore the best medium for advertising all kinds of machinery, tools and materials used by Engineers or their employees.

SUBSCRIPTION—$4 *per annum in advance;* $2 50 *for six Months.*

ADVERTISEMENTS—*The rates are as follows: Inside pages,* 25 *cents per line each insertion; the outside or last page,* 40 *cents per line. Payment required in advance.*

NEWSDEALERS *will be supplied through the agency of the* AMERICAN NEWS COMPANY, *No.* 121 *Nassau street, New York City.*

COMMUNICATIONS *of all kinds should be addressed to the Secretary. The safest method of transmitting money is by checks or Post-office orders, made payable to the order of* WILLIAM VENTZ, *Correspondence and general communications of a character suited to the objects of* THE ENGINEERING AND MINING JOURNAL *will always be welcome.*

The Postage on THE ENGINEERING AND MINING JOURNAL *is twenty cents a year, payable quarterly in advance, at the office where received.*

THE SCIENTIFIC PUBLISHING COMPANY.

WILLIAM VENTZ, SECRETARY.
27 Park Place,
P. O. Box 4404. NEW YORK CITY.

CONTENTS FOR THIS WEEK.

The Wilson Process for Making Wrought-Iron Direct from the Ore	401	Advertisements	407
West Virginia Asphaltum	402	EDITORIALS:	
Safety in Noxious Gases	402	Concentration in Colorado	408
Coal Cutting Machinery	402	Decline in the Price of Coal in Europe	409
The Value and Limits of the Hot Blast	402	The Canal in Winter	409
Lake Champlain Furnaces	403	CORRESPONDENCE:	
The National Academy of Sciences	404	Lake Superior Tin	410
THE COAL TRADE	405	Trying Mint Assayers	410
MARKET REVIEW	407	Baryta—Its Manifold Uses in the Arts	410
Metals	407	MINING SUMMARY:	
San Francisco Stock Market	407	Utah	411
American Institute of Mining Engineers	407	California	412
		Advertisements	412

THE death of AGASSIZ, which has occurred since the issue of our last number, is an event to sadden all who appreciate the value of scientific education in America, and the great services he rendered to that cause by his own example and instruction. Not only as an original investigator of nature, but also as the trainer of a numerous body of active, skillful and profound naturalists, and still more strikingly as a source and support of a wide public interest, amounting to enthusiasm for science, and replacing with us that fostering care which in foreign lands is bestowed on science by the State, AGASSIZ will long be remembered with sorrow and gratitude, even by those who were not personally brought within the sphere of his noble and charming character.

WE publish in another column a communication from Cincinnati, desiring information about the alleged discoveries of tin ore, a year or two ago, on the north shore of Lake Superior. The statement that an article from one of our correspondents at Detroit was published in these columns, giving a glowing account, or any other kind of an account, of these discoveries, is quite erroneous. We extracted an article on this subject from another journal, and published it, giving full credit to its source, and thereby discharging ourselves of all responsibility for its authorship or correctness. We have heard, moreover, that the alleged discoveries of tin on the north shore turned out to be illusory, and even that a novel fraud was perpetrated, involving the unusual and audacious trick of digging out the barren contents of a real, but worthless, fissure-vein, and substituting a mass of disseminated tin ore, with a gangue of artificial stone. But we do not profess to have trustworthy knowledge of the facts and have, therefore, foreborne to comment upon them. If any of our readers is in possession of accurate information upon this point, we shall be glad to hear from him.

THE workmen engaged in mining and smelting in Prussia are united in a kind of self insurance society, the object of which is the common one of supporting the sick, superannuated, widowed and orphaned members of the craft. In 1871 the Union included 91 subdivisions, in which were enrolled the workmen from 2,445 mines, 183 smelting works and 18 salt works, to the number of 101,813 regular and 106,349 occasional workmen. This was an increase of 11,096 men during the year, or 3·2 per cent. of the regular and 7·3 per cent. of the irregular classes. The property of the Union is free from taxation, and, counting up all kinds of effects, amounted in 1871 to 42 thaler 4½ groschen per member, or about $30 40. Of course the war with France told heavily upon the fortunes of the Union. Large numbers of the members were called to the standard, and not only withdrew their contributions but left so many more wives and children to be looked after. This made the year 1870, as well as a large part of 1871, a hard one, and in the latter year the prevalence of small pox and typhus fever in the mining districts greatly increased the casualties among the members. But with all these drawbacks the treasury showed an increase of more than $10,000 in 1871. The statistics of so numerous a body are of interest. On January 1, 1873, the Union was caring for 9,269 invalids and 277 "half invalids." During the year, 1418 invalids were received and 1,051 were removed in one way or another from the Society's care, and 128 half invalids were received and 84 removed. This left it at the end of December with 9,634 entire and 321 half invalids. It was noticeable that superannuation, or rather that condition which, in the language of the Union is called "entire dependence" (*ganz invalidität*), began at a lower age than ever known before. This age has before varied from the 55th year in 1861 to the 48·8th in 1868; but in 1871 it went just one step lower than the latter figure. It stood at the 48·7th year in 1871. It is noticeable that both the periods of serious depression in this average age of beginning dependence follow the great wars of the German nation. Leaving out these two years we have the average age of beginning dependence in ordinary years fixed at 52·41 years; and a fall of close on four years as the result of a general war.

THE corner-stone of the new bridge over the Hudson at Poughkeepsie was laid with appropriate ceremony on Wednesday last. Though this work may not fulfill all the anticipations of its promoters, who look for little less than a concentration of the world's traffic at Poughkeepsie, it cannot fail to have an important effect not only upon the fortunes of that town but also upon the general course of transportation. Amid the bustle of railroad extension which has been so busily pushed for ten years past, one radical change in the conditions of our interior communications has progressed steadily forward; the great water-courses of the country are no longer flanked, as formerly, by crossing them near their head-waters, but, on the contrary, railroads eagerly seek the privilege of bridging them near their outlet. This change cannot fail to work a gradual change in favor of the maritime cities, and those other towns and cities which have become important in spite of disadvantages of position in regard to railroads. The new bridge will be 2420 feet long, with 1080 feet of land approaches; it will rest on 4 piers in the river, and 2 abutments, giving 5 spans of nearly 500 feet each. The piers will rise 210 feet above the river bed, and the tracks will be 194 feet above the water level. The structure will be of the truss pattern, with the tracks laidon the top chord. The land approaches will rest on eight or ten piers, of heights varying from 20 to 90 feet. Mr. A. L. DENNIS, of Newark, is the President; Mayor EASTMAN, of Poughkeepsie, the Vice-President, and Mr. O. H. LENVILLE, of Pennsylvania, the Engineer of the work, which is estimated to cost $2,400,000.

THE crowded state of our columns has prevented an earlier reference to the verdict of the coroner's jury in the case of the Harlem boiler explosion, which will be found in another column. It will be seen that they find the sub-contractors of the "Harlem Improvement," the engineer, the owner and a former owner of the boiler responsible for the disaster, and these gentlemen are held on a charge of manslaughter. The jury showed good sense in making no verdict against Messrs. DILLON and CLYDE, the general contractors for the work of sinking the tracks in Fourth Avenue, and they also took ground in their verdict which fully sustains what we said on the law of accidents at the time of the explosion. After specifying the persons whom they hold responsible, the jury proceed to say: "That we entirely disapprove of, and condemn, the law, as it now stands, in regard to testing and the inspection of steam boilers, and would recommend that the inspection and testing of all boilers should be made incumbent on the makers thereof as well as those using them. And that all styles of boilers should be passed upon as to the matter of safety by a competent board of examiners before being offered for sale, and that such form of boilers as said board of examiners may decide to be unsafe shall be subject to the rules and regulations as laid down by the United States authorities, in the examination of marine boilers. That in our opinion the law for the examination of engineers is altogether inadequate. And we also recommend that a more rigid and careful examination of engineers be made." An inspection of this kind would require a well-managed department for the maintenance of public safety, by the inspection of all hazardous machinery. Such an organization will cost money, and needs time for its establishment, but it is one which is absolutely necessary, and which must be founded sooner or later. Its expenses could be met by a tax on manufacturers, and of its usefulness there could be no doubt.

Concentration in Colorado.

IN the November number of the Georgetown *Mining Review* we find some statistics of ore-dressing which has been done in Colorado in two establishments during last year. One of these works is that of Mr. COLLOM, near Idaho; the other, as we understand it, is a merely temporary plant, erected for experimental purposes by Mr. GEORGE TEAL, Agent of the Terrible Mine, above Georgetown. In regard to Mr. COLLOM's results the *Review* says:

"The following assays of ore and products from the Crystal Lode will show what class of work Mr. COLLOM has been doing since his mill commenced operations.

Raw ore—gold, 1 ounce, silver 16 ounces, producing the following classes of dressed ore: A, composed of zinc blende and iron pyrites, assaying gold, 2·75 ounces, and silver 43·30. B, (composed of galena with free gold), assaying, gold, 22 ounces, silver, 35 ounces. This class carried also 65 per cent. of lead.

The slimes assayed respectively in gold 1 ounce, and silver 75 ounces, and were reserved for further concentration."

The above shows, that a concentration has been effected by Mr. COLLOM, but

we do not think with the *Review*, that it shows "what class of work Mr. COLLOM has been doing." To determine the merits of Mr. COLLOM's work, it seems to us, would have been much easier, had he given us, besides the value, the quantity of his raw ore, the respective quantities resulting of classes A and B and of the slimes, and, finally, the assay of his tailings. As the report reads at present, it is economically worth very little, as it corroborates only the well known fact that Colorado ores can be concentrated as well as others, without giving us a clue as to the more important item of the loss of noble metals, which, from the nature of the ores, must be heavy, and may, perhaps, overbalance the advantages gained by concentration. We do not make these remarks in any spirit of fault-finding with either the *Review* or Mr. COLLOM. The former has, undoubtedly, published all the information accessible, and cannot have any interest in publishing glittering generalities without value, nor does its course so far indicate that it would do so to please anybody. It has been too straightforward and sensible in dealing with matters of fact in the profession, to be liable to such a suspicion. Mr. COLLOM, on the other hand, has possibly not even anything to do with the publication of the item referred to; but if he has, we would ask him to supply the wanting items in the report. They are of great interest, not only to the miners of Colorado, but also to the whole mining profession; to the latter, for the reason that we have actually no statistics at this time in regard to the losses in concentration of such ores as he has been treating.

Mr. GEORGE TEAL, in his report, gives us evidently the whole facts, as he possesses them himself, and they are valuable as showing how much can be done in this direction even with crude hand-machinery, and under many difficulties, incidental to the introduction of processes new to the Western mining regions.

Mr. TEAL worked during the whole year 1568 tons of third-class ore, the average value of which, before dressing, is not given. But the quantities and values of the products of the operation are reported, with the exception of those of the slimes. The different classes of washed stuff obtained were as follows:

A. Pure galena from second jigs.
B. First raggings from first or rough jigs.
C. First-class pickings, or pure ore from the rough screenings.
D. Second-class pickings from the rough screenings.
E. Clean tye-work,
F. Zincblende, separated from the pure galena on second jigs.
G. Third-class rock.

The saleable products were:

Class.	No. of tons.	Ozs. Ag. per ton.	Estimated to realize.
A.	$5\frac{1782}{2000}$	200	$1,178.20
B.	$21\frac{1509}{2000}$	350	8,701.80
C.	$2\frac{1388}{2000}$	550	1,616.40
D.	$58\frac{1279}{2000}$	140	6,772.86
E.	$12\frac{24}{2000}$	350	4,804.80
F.	$16\frac{1071}{2000}$	190	1,109.00
G.	50——	about $10 per ton.	500.00
	$167\frac{1053}{2000}$		$24,683.06

There was therefore produced from 9.3 tons of crude ore one ton of marketable stuff. The immediate result in cash gives $15.74 per ton of crude ore, as the amount actually extracted, and, besides this, an amount not yet determined will be extracted from the slimes, which, Mr. TEAL says, have been stored away for next season's work, when machinery will be employed. They contain too little silver to pay for dressing by hand. The entire season's work has cost $4,398.25, or $2.80½ per ton of crude ore. This, Mr. TEAL thinks, he can reduce next year by the use of machine power, to $1.50 per ton. The tailings from every stage of the process were assayed repeatedly, and were found to contain from 2 to 6 ounces of silver per ton. A fair average for the whole lot would be, according to Mr. TEAL, 4 ounces per ton.

The whole season's work is considered very satisfactory, making allowance for the imperfection of apparatus and the inexperience of workmen. From both of these drawbacks next year's operations are expected not to suffer, since, now that the experimental work has made such a fair showing, permanent machinery can be erected with full confidence.

Mr. TEAL says that he expects to realize in England for his dressed stuff about $2 per ton more than he estimated; and after deducting from the sum thus obtained the cost of concentration, there would be a clean gain of $14.94 per ton of material, which, in its crude state, would have been without any immediate value for the company.

It is to be regretted that the report does not give the quantity and value of the slimes, as, if this was the case, the percentage of losses up to the present stage of the work might have been determined, though the loss in working the slimes, which, according to all precedents with even more favorable ores, will be very heavy, would still remain to be added. At present we can only see that the losses in jigging stand to the value actually extracted in the proportion of 25·4:100. Such a loss, it is true, is a very heavy one for those processes of dressing, which handle the coarser sizes only. But more machinery, and an improved system in the handling of the ores will, no doubt, decrease these figures materially. Meanwhile it is gratifying to see that a way has at last been successfully introduced in Colorado, which permits the miner to utilize, *with a profit*, the vast amount of low grade ore, which, hitherto, has been for him a source of expense only, without any corresponding return. Under these circumstances he can afford some waste for a time. The general attention now directed to the subject will, no doubt, soon devise means of bringing losses down to the minimum, consistent with the nature of the materials treated.

Decline in the Price of Coal in Europe.

PRIVATE advices from London, under date of December 2d, make mention of a decline of 6s. per ton in coal having taken place within the previous ten days. This break in the coal market has been predicted for some time past, and it will exert a great influence on English manufacturing industries, and especially on the iron trade, which was very seriously affected by the enormous price of coal.

The reduction above noted is undoubtedly due, in a great measure, to the efforts to economise fuel in every possible way, which have been induced by the high prices, and, to a less extent, by the financial flurry which recently passed over England and culminated there in a 9 per cent. Bank of England rate.

It is confidently expected that the less demand for the manufacture of iron, the opening of new pits, and the introduction of coal cutting machinery, will still continue to reduce the price of coal, and indeed there is still room for it to fall considerably. Some idea of the excessively high prices which have ruled in the English coal market during this year may be inferred from the enormous profits of most of the coal companies. "Messrs. BRIGGS & Son have declared a dividend of 17½ per cent., besides a bonus of 10 to 22½ per cent. to the workmen." Some Cardiff firms are stated to have cleared £400,000 ($2,000,000) in 1872. Where formerly the average profit of the colliery owner was about 50 cents per ton, during the past year it has been 2 50 to $3 00 per ton.

We note also in our French and Belgian exchanges that a very considerable reduction (amounting to $1 50 to $1 75 per ton) in the price of coal is taking place generally on the Continent. And this in turn will revive the iron trade. Every public grievance in England, and latterly on the Continent, induces the appointment of a Parliamentary or Government Commission, to investigate its causes and suggest a remedy. So crying an evil as high priced coal—which really strikes at the very foundation of national industry—has been so treated, and is now being investigated in France by a "Commission." Among the suggestions made to it by the Lille committee, we note,

1st, That coal mining companies should be required to sink a number of pits bearing a due proportion to the extent of their concessions.

2d. That they should employ all the mechanical appliances which modern science has placed at their disposal.

3d. That they should increase the number of work people by the means adopted in England and Belgium, such as the construction of houses, the employment of recruiting agents, the giving of premiums, &c.

4 h. That the holders of concessions which are suffered to remain inactive should be required either to immediately work their concessions or to abandon them.

In France all minerals belong to the State, and the Government has the power to impose on the "concessionaires" what conditions it sees fit, to secure the greatest benefit to the country at large; hence suggestions, which in England or this country would justly be held as an undue interference with private property. After all, the simplest remedy is not difficult to find. If the production of any article of commerce becomes exceedingly profitable, capital will naturally seek investment in it, and the supply will increase till it equals, or exceeds, the demand, when prices will fall naturally and inevitably, without any special legislation. The case, however, is somewhat different where the total supply and field for supply is owned or controled by a few individuals, or corporations, that have it in their power, by combination, to make and keep the price of their products at any figure they desire. We have seen something of this here, and we have by no means, seen the last of it. The present price of anthracite coal is not so high as to afford much real ground for complaint, but the effort to regulate the price by an agreement among the large companies, altogether irrespective of the supply and demand, is a very important question, and one which may assume a more serious form than is now generally allowed.

The Canal in Winter.

WHEN Mr. ROBERT CHESEBROUGH published his scheme for keeping canals open in winter by warming the water, his project was received with such general ridicule, that we believe this journal stood alone in granting its author the possession even of common sense. But Mr. CHESEBROUGH has now published a second pamphlet containing opinions by Prof. THURSTON and Dr. VAN DER WEYDE upon his scheme, and they both take ground similar to our own—that is, that the plan proposed is no way deserving of ridicule, but does fairly merit careful investigation. Prof. THURSTON has gone into the subject very carefully and comes to the conclusion, also independently expressed by us, that the problem contains elements which have never been determined, and which are worthy of attention. These questions are: the amount of ice which forms during the winter, the amount of protection it affords the fluid water, the effect of boats keeping the thin ice broken up, etc. Eliminating all but the first of these, and estimating that the average thickness of ice formed in the Erie canal during the winter at two feet, he finds that one mile of canal, 35 feet wide, would be covered with 369,600 cubic feet of ice; and this would require 3,020,001,600 British

thermal units to melt it. A ton of anthracite containing 90 per cent. of carbon, and giving out 75 per cent. of the heat produced, would yield 10,000 thermal units, so that the ice on one mile of canal would be melted by 302,000 lb. of coal, or 134.8 tons; allowing, also, 10 per cent. for loss of heat in warming the water, he arrives at the round number of 150 tons per mile. His estimates, therefore, differ from those of Mr. CHESEBROUGH, and in their financial calculations they separate still more widely. Prof. THURSTON points out that the intensity of cold in winter is not a regular thing, and that the apparatus must be made large enough to answer for the coldest days. This increases the first cost to $12,000 per mile, and the running expenses are estimated at $3,520 per mile. This is for a canal of 35 feet width. If the prism is made 70 feet wide, as proposed, the expense will not be doubled, but will amount to $22,500 for plant, and $6,305 for running expenses.

These items are, however, modified by various considerations. Thus, steamers are used as ice breakers, and if they are supplied with condensing engines they would act as moving ice melters as well as ice breakers. If canal boats are to be propelled by steam, a proposition which is extremely probable, they could by law be compelled to use condensing engines, and by their number they would contribute very materially to the amount of heat supplied to the water. Their movements, too, would have an important effect in breaking up the ice, so that a whole fleet proceeding along the canal could make its way at an expense which would not be great for any one boat. In fact, ice does not form so readily in agitated water as in still water, and thus the boats would contribute a mechanical means of preventing the formation of ice.

Taking all these points into consideration Prof. THURSTON says: "If the capacity (of the heating apparatus) were such that it would be capable of destroying ice one inch thick in twenty-four hours, or possibly even somewhat less, the steam ice breakers would be able, at comparatively moderate expense, to keep the channel open in all but the coldest days of the winter, until the extreme cold weather had passed, and thus the heating apparatus could be given more nearly a capacity for average work as proposed, its expense would be correspondingly reduced and the total expenditure per annum would approximate to a maximum. The favorable circumstances already described would in this case also find their fullest development. Proceeding on this basis, which should be regarded simply as representing my individual views, my estimates would become for a canal 70 feet wide:

Cost of plant per mile:

Heating apparatus	$12,000
Distributing apparatus	2,500
Buildings and land	1,250
Total	$15,750

Cost of maintenance per mile and per annum:

Repairs and depreciation	$1,450
Interest on capital	1,102
Coal—300 tons at $4	1,200
Two men—three months, at $60	360
One man—four months, at $60	240
One man—three months, at $90	270
Superintendent and contingencies	150
Total	$4,772

Total estimates for canal 350 miles long, 70 feet wide, in the latitude of central New York:

First cost, 350 miles, at $15,750	$5,412,500
Maintenance per annum, 350 miles, at $4,772	1,670,200

Professor THURSTON, as we said before, thinks that the scheme deserves investigation, and that an engineer of proper ability would be able to determine all the doubtful points without difficulty and at very moderate cost.

Mr. CHESEBROUGH dissents from the estimates of Professor THURSTON, but these financial questions are not at present the interesting ones. Enough has been shown to warrant a full trial of the project. He makes a new suggestion, however, upon which we will have a word to say. It is, that ice might be prevented from forming by pouring petroleum on the water, a thin film of this fluid being an effectual preventive of ice; also that if thick ice forms during a cold snap, it can be made very rotten by burning benzine on the surface. Unfortunately, there is experience on record of rivers covered by petroleum and this experience is not of a kind which can encourage its intentional use. A canal is lined in every mile of its length with buildings and boats that are too valuable to be lightly exposed to fire, and we hardly think that the suggestion is one that can be carried out.

CORRESPONDENCE.

Lake Superior Tin.

CINCINNATI, Dec. 10, 1873.

TO THE EDITOR—Sir: Having spent some months in the "Upper Country" (Lake Superior) a few years since, and having friends in that section still, I have naturally continued my interest in, and watched the progress of, events in that very interesting and attractive region. Not quite a year ago when the "tin fever" was at its height, in looking over the ENGINEERING AND MINING JOURNAL, at the Young Men's Mercantile Library rooms in this city, my attention was directed to a lengthy article from one of your correspondents—at Detroit, Michigan, I think—giving an exceedingly glowing account of the so-called tin discoveries on the north shore of Lake Superior, and also showing the result of analysis by Prof. ———, of Detroit. This letter, or its substance, afterwards, or simultaneously, appeared in several leading papers in various parts of the country, and *possibly* lead some persons to invest in "Tin stock." As I have since understood—I hope I may have been misinformed—the whole affair proved a *huge swindle*, and the majority of the deluded investors have, perhaps, ere this *charged up* their losses.

I have looked over the file of your paper pretty faithfully for some time, hoping to derive some *positive* information, either *pro.* or *con.*, in relation to this "Tin" matter, but thus far unsuccessfully. Do you not think it is due your many readers who look upon articles that appear in your paper, as generally founded upon fact, (I say this with every respect for them and you,) that you should tell the "other side" of the story, and set the minds of a few *doubting ones* at rest? Please give us *the facts*, Mr. Editor, and greatly oblige many seekers after

"TIN."

Trying Mint Assayers.

THE accuracy of government assayers in all countries has been frequently tested by sending them samples of a uniform alloy. As a general rule, the result of these trials has been such as to confirm the common opinion which regards the assay by cupellation as a very delicate and accurate operation. But there have also always been discrepancies which were sufficiently great to seriously affect the average of the results, and the differences were quite likely to occur in the reports of the most celebrated assayers. We believe, no explanation of this anomaly has yet been found; but that cupellation and the other modes of assaying bullion must be accurate, is proved by the fact that large transfers of bullion are made on the basis of such work and without serious difficulty. A trial of English assayers was lately made under the following circumstances which are detailed in the *Chemical News*:

"The attention of the Committee was first directed to a series of experiments which were instituted with a view to ascertain to what extent the weight of pieces of pure gold and alloys, synthetically prepared, would be affected by submitting them to the process of assaying, and consequently how far the results of assay operations are trustworthy. These results showed that the maximum error was only 1-100th per cent. of the original weight of the assay piece, and consequently that the result obtained by assaying gold represents the composition of the portion of metal under examination to the 1-10,000th part, a fact which will doubtless appear remarkable to all who are accustomed to the ordinary methods of quantitative analysis.

"The committee are not unmindful that, although it is possible to attain this high degree of accuracy, it is nevertheless well known that a comparison of the assay reports of the different assayers as to the composition of the same ingot might often disclose discrepancies of 5-10,000th parts.

"Thus portions of metal from nineteen gold ingots were assayed by the Mint Assayer and were then sent to five assayers, each of whom furnished an independent report. Two assayers alone agreed as to the value in each of 15 ingots, in 3 ingots three assayers were in accordance, while in one instance all the assay reports differed; and, viewing the reports generally, the discrepancies varied from 4-10,000 parts to 1 part of fine gold in 1000 of the alloy, or an average deviation of 6-10,000th parts.

"These small variations assume serious proportions when they affect the value of large quantities of bullion; for instance, the value of gold coined in the Mint during the past year was £15,200,000, and a persistent error in the assay reports of only 1-10,000th part would have been attended with a gain or loss to the department of no less than £1500. The Committee have entered upon the following investigations, in the hope of being able to define the condition under which errors arise:—

"The method of gold assaying, as practiced in the Mint, is given in the Appendix, and the method has been deliberately adopted by all assayers with slight variations of manipulation, which have not as yet been minutely examined as the Committee considered that when widely divergent results are obtained, the gold employed by one or other of the assayers is impure, and that either the amount of impurity has not been ascertained with accuracy, or that it altogether escapes detection. It follows, therefore, that the weight of the 'cornets,' when compared with the initial weight, the portion of metal operated upon appears to indicate the presence of an amount of gold which is in excess of the true amount of precious metal present in the alloy.

"The Committee obtained specimens of gold from different sources, and tested them side by side with gold prepared in accordance with the directions of the Lords Commissioners of Her Majesty's Treasury, by the Chemist of the Mint for use as a standard trial plate in testing the coinage. Great care was taken in the preparation of this gold, 80 ounces of which were precipitated from no less than 100 gallons of chloride of gold, and experiments have already shown that it is very pure. The Committee propose that they adopt it as the basis for a new series of comparisons."

Baryta—Its Manifold Uses in the Arts.*

BY DR. LEWIS FEUCHTWANGER.

The various salts of baryta have long been employed in pyrotechnics; as admixture to white lead; as material almost indispensable to card makers for a permanent white; in sugar refining; in chemical operations, etc.

In nature we find but few varieties. The sulphate, composed of 66 per cent. baryta and 34 per cent. sulphuric acid, is abundant in England, France, Germany, and the United States, where it most generally is found in connection with beds or veins of metallic ores, as gangue, or veinstone. Sometimes, however, it forms distinct veins, in company with the secondary limestone, and very often in fine crystals, along with calcite and celestine. Crystals of large dimensions occur in Westmoreland, Cornwall, Cumberland, and Derbyshire, in England. Beautiful specimens of septaria, cut and polished for table and other ornaments, having linings of brown heavy spar, are wrought in Durham, England, in Hungary, at Freiberg in Saxony, Clausthal in the Harz, in Bohemia, and in Auvergne, France.

The localities in the United States are very numerous. The States of Connec-

*Read before the Polytechnic Club, Dec. 4, 1873.

ticut and Missouri have long furnished abundant material for the arts. Next come Virginia, New York, New Hampshire, Massachusetts, Pennsylvania, Kentucky, and Tennessee. In Canada, fine crystals occur, and massive baryta in a 27-foot vein. It is reported from New Mexico also.

The Bologna spar is the ornamental stone, of a brown color and concentric rings, originally found in a bed of clay near Bologna, where it formerly was considered a great curiosity, on account of its phosphorescence, displayed after heating with charcoal, and it was called the Bologna phosphorus. The common name of sulphate of baryta is heavy spar or barytes; specific gravity 4.5, and hardness 3. It is found in nature in large crystals, weighing 100 lb. and more, and in slender needle crystals; also in massive aggregations of tabular crystals; likewise columnar and radiated, and in globular and nodular concretions; also lamellar and granular, earthy and stalactitic.

The sulphate of baryta often occurs associated with lime and some silica and alum, and is then called calcareoborite; and if it is associated with strontia, it is called baryto-celestine. If the sulphate of baryta gives out a fetid odor on striking or rubbing it, it is called fetid baryta. The name of baryta is derived from the Greek language, *βαρυς*, heavy.

Witherite is a carbonate of baryta, having a sp. gr. of 4., and a hardness of 3.2, and consists of 78 per cent. baryta and 22 per cent. carbonic acid. This mineral is found in considerable quantities in England, at Alston Moor in Northumberland, in Silesia, Hungary, Styria, Sicily, Chili, but not much in the United States. It is extensively employed in the manufacture of plate glass and the manufacture of beet root sugar in France, and for the production of blanc-fix, or permanent white; it is much used of late for paint, particularly in combination with soluble glass and white oxide of zinc.

The metallic base of the baryta salts is called barium, and is obtained from the carbonate of baryta, or chloride of barium, if put in a platinum dish and connected with the positive pole of a strong galvanic battery, in order to decompose it, mercury being placed in a hollow made in the baryta and connected with the negative pole. The result is an amalgam, which may be distilled in a bent tube filled with hydrogen. Barium is a white, malleable, and fusible metal, which oxydizes easily in the air and decomposes water at common temperature. For the purpose of obtaining the pure baryta, or barium oxide, the nitrate is calcined at a red heat in a silver or porcelain crucible, or the carbonate is mixed with pulverized charcoal in a covered crucible, and then exposed for an hour to a strong heat. If oxygen gas is passed over it, it will absorb that gas with avidity and become a peroxide. This is the substance used at the present day for the production of the peroxide of hydrogen, which is much recommended as a medical reagent, and employed in the arts for bleaching animal tissue, or converting brown into blonde hair. To prepare it, the peroxide of barium is treated with hydrochloric acid, and the liquid is quickly evaporated to syrupy consistency, when it yields a slight chlorous odor. It decomposes easily into water and oxygen, and it is therefore almost impossible to prepare it properly in hot weather. At 212 deg. F. it decomposes with violence.

The oxide of barium, or caustic baryta, unquestionably rivals in causticity with potash, soda, and ammonia, and may be easily employed in the compounds with chromic acid.

The chloride of barium is obtained by fusing the sulphate of baryta, or native heavy spar, with chloride of calcium (the residue from the preparation of ammonia), in a reverberatory furnace, and subsequently extracting with hot water, leaving the sulphate of lime undissolved.

The chlorate of baryta, which is now extensively used for producing a pure green flame in the manufacture of fireworks, is prepared by dissolving the artificial carbonate of baryta in caloric acid solution, when it forms beautiful shining tabular crystals. It is dangerous to keep it on hand when mixed with charcoal or sulphur.

Nitrate of baryta, which is likewise used in fireworks, may be easily prepared by dissolving the native carbonate in nitric acid and evaporating the solution, whereby octahedral crystals of the nitrate are deposited.

The native sulphate of baryta is generally used for the adulteration of white lead or paint, to the extent of 25 to 50 per cent. Of this mineral, 4,000 tons are produced annually in Connecticut, and 2,000 tons in Missouri, while 10,000 tons are imported from England and Germany. The native mineral, if very white and free from iron coating, is finely ground and dressed with water. But most of the native mineral contains fine particles of iron, and hence requires a different treatment, namely, calcination for some hours, in order to oxydize the iron to a higher degree, when hot water, and, if necessary, a little sulphuric acid, will take up all the iron, and a beautiful white, heavy powder is deposited, which is then dried, either by steam or in the same manner as whiting is dried, in the atmosphere. White oxide of zinc, as well as white lead may be mixed with sulphate of baryta in linseed oil to a pigment, which is then fit for in- and out-door painting, and spreads well.

The artificial sulphate, called white or *blanc fix*, which is now largely manufactured in France, England, and the United States, is used in the manufacture of a paper of the purest white, in imitation of linen, and used for cheap collars, skirts and cards. It was formerly manufactured from the native carbonate of baryta, but is now prepared from chloride of barium, which is obtained in England as a waste product at a reduced price. This is decomposed with sulphate of ammonia and a pure sulphate of baryta is precipitated. Another process for obtaining the chloride of barium, in order to prepare the permanent white, is by decomposition of the native sulphate of baryta with chloride of sodium, in a strong fire and the subsequent solution of the fused mass in boiling water. The result is chloride of barium and sulphate of soda or glauber salt. About 5,000 tons of permanent white are annually manufactured in this country and Europe.

In the chemical laboratory, the barium salts are indispensable for the determination of sulphuric acid, which forms the sulphate as an insoluble precipitate. The carbonate of baryta is a strong poison to animals, and is used for killing rats, etc.

A green paint, composed of manganese and caustic baryta, under the name of manganese green, has been brought to market from abroad, but was soon superseded by the beautiful Guignet green, a composition of aniline and iodine.

The beet sugar refiners of France have very successfully employed both caustic baryta and the carbonate in their operations. They treat, first, the saccharine juice with lime and then with carbonic acid, in order to clarify it. Afterwards, they add the baryta in order to obtain an insoluble precipitate, a saccharate of baryta. After passing sufficient carbonic acid gas under a pressure of about half an atmosphere upon this precipitate, a separation takes place, and without any evaporation the hot solution is left to crystallize.

In copper metallurgical operation, the sulphide of barium has latterly been employed for the purpose of precipitating from an ammoniacal copper solution the copper as a sulphide, which is treated in the usual method for a reduction, either by caustic lime or by borax or by a galvanic current.

The artificial carbonate of baryta, obtained by passing carbonic acid gas through a sulphide of barium, whereby the carbonate of baryta is precipitated, is much used in Europe in glass making for producing an achromatic glass. In 1826, I assisted in Jena my teacher, KOERNER, in experiments for this object.

THE following figures give the quantities of coal raised in Great Britain, with the loss of life which took place for each year, from 1868 to 1872:—

Date.	Tons of Coal Raised.	Deaths.	Tons of Coal Raised per Death.
1868	104,566 959	1011	103,429
1869	108,003,482	1116	96,777
1870	112,875,525	991	113,900
1871	117,439,251	1075	109,246
1872	123,393,853	1060	116,400

The chances of a collier's life may thus be accurately calculated according to the quantity of coal raised, the ratio being closely preserved year after year with dreadful regularity.

THE British exports of coal for the nine months ending 30th September, by the Board of Trade Returns, amounted to 9,444,464 tons, of the value of £9,924,272, being about 650,000 less in quantity, and £2,700,000 more in value than for the same period of 1872. For the month of September the exports of coal were 1,134,893, of the value of £1,168,441, being 74,000 tons less in quantity than for September, 1872.

MINING SUMMARY.

Utah.

From the Utah *Mining Gazette* of Nov. 29.

JORDAN HILL MINES.

The Galena and Jordan mines are situated on Jordon Hill, Bingham main canyon, and about three miles above Bingham City. Both mines are in close proximity to each other, and are owned by the same company, Messrs. CARSON & BUZZO, as are also the galena smelters at West Jordan. We will, therefore, for brevity's sake, speak of the mines hereafter, in this report, as one and the same property, and call it the galena mine, this being, we believe, the prior location.

Jordan Hill, on which the mine is situated, is one of many ponderous spurs from the side of the main mountain that forms the northern side of Bingham Canyon. The hill is formed by a small ravine running down on either side from the summit of the main ridge, to the stream in the bed of the canyon. The original Galena mine is situated close to the ravine, on the right hand, or most easterly side of the hill, and but a short distance from the canyon road. The Jordan mine is slightly more elevated at its initial point, and is on the left, or westerly side of the Galena, and consequently, farther round on the back of the hill. The ore dumps are easy of access to the teams employed to transport the ore from the mine to the smelters, on the Jordan. There are two ore dumps connected with this property from which shipments are made.

The Galena mine, for such we are calling the entire property, has a linear extent of 7400 feet, by 140 feet in width. The vein which is worked on the surface as well as underground, has been exposed by removing a thin layer of loam, for a distance of 1000 feet. On this vein a very large open drift has been run, from which thousands of tons of ore have been taken, and thousands of tons still remain. The interior workings of the mine reveal the fact that the deposit on which these locations are made is, in all probability, inexhaustible. Computations have been made at various times by those who have had an opportunity of going through this wonderful mine, as to how much ore was in sight. Some estimating it at a hundred thousand tons. Extravant as these figures may appear, they undoubtedly represent an extremely low estimate of the actual bulk revealed by the explorations of to-day. The interior workings consist of 1450 feet of tunneling; 850 feet of shafting, and 280 feet of cross drifting. Making the aggregate amount of cutting done, above and below, 3620 linear feet, through a solid bed of carbonate ore, interspersed with galena. The ore differs in value, in various parts of the mine, some portions going from twelve to sixty ounces silver, and 50 per cent. lead; others, from sixteen to fifty ounces silver with a similar per centage of lead. The latter being the assay value of the ore now being shipped. The gross value of the ore is $50 per ton, in the mine. The cost of mining, transportation and manipulation, $25 per ton. Thus is will be seen, that if we put the amount of ore in sight at the very moderate estimate of 100,000 tons, we have a gross value of $5,000,000; yielding a net profit to the company, of $2,5000,000.

The mine is worked at an outlay of $3000 per month; while the ore shipments

average from fifty to one hundred tons per day. Thirty men are employed, pending the completion of the company's new smelting works on the Jordan river, when the force will be increased, and shipments made to meet the full demand of the works; viz.: one hundred and fifty tons per day.

It would be useless to attempt a computation of the probable value of the mine's resources, as its walls have not yet been reached by any of the explorations made. The extent of the deposit, therefore, cannot be imagined, much less correctly defined. The large amount of drifting and tunneling has been done as much with a view to tracing out 'gopher hole' locators, who have clustered around this property as thick as locusts, as to prospect the mine. Something over a score of such locators, and jumpers, have been dislodged by this means, and no less than fourteen in one day.

One of the principal features noticeable in working the mine is that little hoisting is needed; indeed, we do not remember seeing more than two hand windlasses on the works. The tunnels are run so as to tap the shafts, through which all the ore from the upper parts of the works is dumped into cars, and by them conveyed to the shipping dump outside. Another characteristic of the mine is that no rock, or foreign substance, worth mentioning has been encountered, which makes mining easy, and renders drilling and blasting unnecessary, thereby saving much expense.

The "strike" reported to have been made about three weeks since, was made after cutting through a wall of low grade ore from five to six feet thick, leading into the hill from the forty foot level in the open cutting, and consisted in discovering a vein of the highest grade ore yet struck, eleven feet thick. The ore in the bottom of the main incline, at a depth of 145 feet from the surface, is also found to be of superior quality to that taken out in other parts of the mine at a less depth. It will be remembered that no stoping has been done, and not a pound of ore has ever been taken out, other than that necessary to run tunnels, drifts, etc., notwithstanding the immense bulk smelted by the Galena Smelting Works, and the thousand tons extra sold to a Chicago company lately.

The company's smelters at West Jordan, a small settlement situated on the banks of the Jordan river, at a point where it forms a junction with the Bingham Canyon Railroad, are situated on a commanding bluff on the east side of, and overlooking the river. The old works consist of three furnaces, two built on Mackenzie's patented plan, and one cupola. The blast is furnished by one Mackenzie and one Root blower, and a thirty h. p. horizontal engine supplies the power. These works turn out eleven tons of bullion per day with two furnaces. The bullion is smelted from ore taken from the Jordan mine, and carries fifty ounces silver, and half an ounce of gold to the ton. The new works when completed, will consist of four reverberatory furnaces, and six cupolas. The buildings for the reception of the furnaces are already in course of erection, as are also two of the reverberatory furnaces. The smoke stack is sixty-three feet high, with a three feet six inch draft. It is built of brick, on a foundation of rock ten feet deep. The stack is connected with the reverberatory furnaces by means of two covered arched flues, each one hundred and fifty feet in length. These, together with the stack, are already completed. The natural formation of the bluff is well adapted to the purpose for which it has been selected, as it rises abruptly, probably thirty feet, above the level of the water-washed bed by which it is bounded on the river side, thereby affording ample room for dumping slag and other waste for years to come. It is on the north side of this precipitous bluff that the new works are being built. The building to contain the reverberatory furnaces is being erected on a foundation excavated out of the side of the bluff, eight feet below the level of its summit; while the house in which the six cupolas are to be built, will be still nine feet lower, on a similar foundation. The reverberatory furnaces are to be placed two at either end of the house while the center part of the building will be divided by partitions into three compartments. Two are to be used as ore houses; the middle one for storing fuel. The object to be attained by using reverberatory furnaces in the treatment of these ores, is the saving of expense in slaging, as coal can be used in these furnaces for that purpose at a cost of $9.00 per ton, instead of charcoal in the cupolas, which costs $40.00 per ton. A track connecting with the U. S. & B. C. R. R. lines will be run along in front of the reverberatory furnace house, so that ore and coals coming by either of these lines, can be easily deposited in their respective receptacles, and are shipped in return.

California.

From the *Mining and Scientific Press* of Nov. 29:

ALPINE COUNTY.

X L.—Alpine *Chronicle*, Nov. 15: The water having been pumped out of the shaft, work has been resumed where the heavy body of water has been struck.

SILVER MOUNTAIN—Alpine *Chronicle*, Nov. 22: Manager CHALMERS has his teams busy hauling ore from the mines to his mill, preparatory to making another run before snow flies. The rock is considered the best ever brought from the mines.

MONITOR—The Schenectady mill has been pounding away on rock from the old dump for the past week.

N. & N. W.—The Carson river is again pouring its waters over the newly repaired dam. The structure is greatly improved in every respect. Work is being pushed forward in the Silver Glance shaft and tunnel. At the bottom of the shaft the ore is looking quite promising. In the west drift there is quite an improvement in the rock. Three samples taken from seams in the face assayed $54, $39 and $39 per ton, respectively.

CALAVERAS COUNTY.

Calaveras *Chronicle*, Nov. 22: Work has been commenced in the great hydraulic claim of VEITH & Co., located in Tunnel ridge—the first "piping" of the season in this vicinity. During the summer the sluices connected with the mine have been raised twelve feet above their original position for the purpose of affording a better "dump" for the tailings, and for working to advantage. It will give a good account of itself this winter. Other claims are in readiness to commence operations so soon as the water supply will warrant it.

GARLAND'S MILL.—Garland's new mill, at Mosquito, is in readiness to run, with the exception of the lack of steam pipe. That will be on the ground shortly, and the battery immediately set at work upon Good Hope rock.

SAN BRUNO—Operations are being pushed very briskly at the San Bruno mine at Mosquito Gulch. The lower tunnel is now in 400 feet, and being driven ahead day and night. There is every indication that the ledge will be shortly reached. Work has also been resumed in the upper tunnel. There are a thousand tons of quartz in sight that will pay all the way from $10 to $75 per ton. The rock is to be crushed in Garland's new mill. The Yellow Jacket and Carey Consolidated Mining Company have purchased the machinery formerly in use upon the Merrimac claim, at Central hill, and removed it to their mine about two miles above West Point. The machinery consists of an engine and boiler.

EL DORADO COUNTY.

Montana *Democrat*, Nov. 22: Some day next week a large mortar for the St. Lawrence mine will be cast at MOREY'S foundry. The pattern has just been completed by Mr. KEMP and he contemplates the largest casting ever yet turned out at this foundry. It will require something over forty-five pounds of metal. This is the first of a set of six which have been offered by Superintendent RODDA for the St Lawrence mine, each designed to receive a five-stamp battery. They are to be much heavier and stronger than those heretofore used, and practically unbreakable.

MARIPOSA COUNTY.

Mariposa *Gazette*, Nov. 22: Funk Hollow mine is situated on Gentry's Gulch, some ten miles east of this place. Its vast richness in former days is well known but like many other mines, from a lack of judgment or bad management, it was suffered to remain idle for a number of years, until about two years ago a San Francisco company commenced the work of re-opening and sinking, under the superintendence of H. G. COWARD, the former owner. Mr. HANAGAN, who is in charge, struck a permanent vein of great richness. The main shaft is down 360 feet; the vein increasing in size and richness, the ore being of high grade. The Bandareta mine was formerly the Eclipse, from which the GOODWIN BROTHERS took out those hundreds of thousands. After them PETER WYNANT became the owner. He too, took out large amounts, but it seems that they lost the lead and gave it up as a "petered" mine. Some time ago Mr. WYNANT made an arrangement with a San Francisco company, who placed it in charge of Mr. HANAGAN. Mr. HANAGAN intends starting up the mill on Monday next, if there is a sufficiency of water. The John L. Scanlan mine is situated on the opposite side of the river from the Bandareto. Mr. SCANLAN has had several lots of ore from this mine worked, which paid a handsome profit over expenses. There are several other old abandoned mines in the immediate neighborhood of those above mentioned, to wit: The Martin & Walling, the Cherokee and Haslop, all of which have been profitably worked—the Martin & Walling in particular; it was of fabulous richness, and there is no question of all of them proving equally as rich as those above mentioned. The re-opening of these mines has had the effect of starting out a number of prospectors. Some of them have been rewarded with very flattering promis s. Quite a number of good prospecting new veins have been discovered in proximity to the above mentioned mines, and as capital seems to seek investment in this particular region the day is not far distant when the North Fork and Gentry's Gulch diggings will be a second Washoe.

MISCELLANEOUS.

HINRICHS.

31 PARK PLACE, (up stairs.

CORNER OF CHURCH ST., OVER STARCH WAREHOUSE

Has now ready his 73rd annual display of

Holiday Fancy Goods,

TOYS,
BRONZES,
CLOCKS,
PARRIAN, LAVA,
MAJOLICA,
BOHEMIAN AND BELGIAN GLASS.

FANCY AND TABLE CHINA, &c.

and respectfully invites his customers and the public generally to favor him with a call.

Assortment Large and Prices Moderate, to Suit the times.

dec2—6t

OLIVER'S POWDER.

This Powder recommends itself for its

SUPERIOR STRENGTH

and

FREEDOM FROM SMOKE.

Direct orders to

PAUL A. OLIVER,

dec9-1y WILKESBARRE, PENN.

J. W. HARDEN & SON,

MINING ENGINEERS,

430 *Walnut Street, Philadelphia.*

Coal and Iron Ore properties reconnoitred and reported on. General plans, Working drawing, and Estimates of Mining structures and Machinery supplied. Periodical underground Surveys made and kept up. Geological and Geographical Surveys made. April 22.1y

THE IRONMASTERS' LABORATORY.—Exclusively for the Analysis of Ores of Iron, Pig and Manufactured Iron, Steels, Limestone, Clays, Slags & Coal for Practical Metal lurgical Purposes. No. 339 Walnut Street, Philadelphia.

J. BLODGET BRITTON.

This Laboratory was established in 1866, at the instance of a number of practical Ironmasters, expressly to afford prompt and reliable information upon the chemical composition of the substances above mentioned, for smelting and refining purposes. The object being to make it at once a convenient, practically useful, and comparatively inexpensive adjunct to the Furnace, Forge and Rolling Mill.

CHARGES TO IRON WORKS.

For determining the per cent of pure Iron in an ordinary Ore, $4 00; For the per cent. of Pure Iron, Sulphur and Phosphorus in do., $12 50,; For each additional constituent of usual occurrence, $1 50; For those of unusual occurrence or difficult to determine, the charge must necessarily depend upon circumstances. For determining the per cent of Sulphur and Phosphorus in Iron or Steel, $12 50; For each additional constituent of usual occurrence, 4 00; For the per cent. of Carbonate of Lime, and Insoluble Silicious Matter in a Limestone, $10 00; For each additional constituent, $2 00; For the per cent. of Water, Volatile Combustible Matter, fixed Carbon, and Ash in Coal, 12 50; For determining the constituents of a Clay, Slag, Coke, or of an Ash of Coal the charges will correspond with those for the constituents of an ore. For a written opinion or letter of instruction the charge must necessarily depend upon circumstances. Printed instructions for obtaining proper average samples for analysis furnished upon application.

Advertisements.

As a medium of advertising, the advantages of

THE ENGINEERING AND MINING JOURNAL

are well known.

1.—It is the highest authority in matters of Engineering, Mining and Metallurgy.

2.—It has a large circulation among the Engineers and Superintendents of Furnaces and Mines, and among the manufacturers of mine machinery and supplies of all kinds; that is, among all important producers and consumers.

3.—It is the organ of THE AMERICAN INSTITUTE OF MINING ENGINEERS, publishes all papers and proceedings, and is regularly received, read and preserved by all the members, American and foreign, of that large and powerful Society, *the only one of the kind in this country.*

4.—It gives more full, trustworthy and practical information on all subjects connected with our Coal and Iron industries than any other paper in America.

5.—Its editors are Engineers of long practical experience, and are constantly applied to for advice on the purchase of mine supplies—machinery, coal, etc., etc.

6.—Its editorial descriptions and criticisms of processes, machinery, mining operations, etc., are copied and commented upon by numerous American and foreign professional periodicals.

7.—Its illustrations of machinery, etc., are clear and beautiful.

8.—It is filed and bound by its subscribers, and is thus doubly valuable as a permanent means of keeping an advertisement before the public.

9.—Its terms to advertisers, considering the advantages offered, are more favorable than those of other industrial or technical weeklies.

Address the

SCIENTIFIC PUBLISHING COMPANY,

WILLIAM VENTZ, Secretary,

To whom all business communications, checks and Post Office orders should be addressed.

27 Park Place, New York City.—P. O. Box 4404.

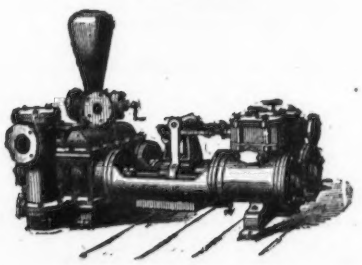
HYDRAULIC WORKS.

MANUFACTORY,

BROOKLYN, N. Y.

Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps,

MINING PUMPS,



Water Meters, Oil Meters; Water Pressure Engines.

Steam and Gas Pipe, Valves, Fittings, etc. Iron and Brass Castings.

☞Send for Circular.

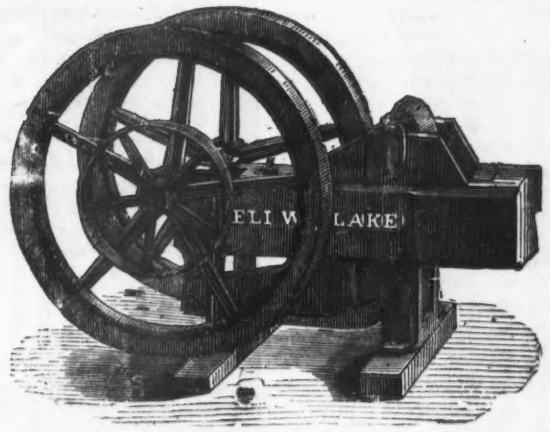
H. R. WORTHINGTON,
59 Beekman street, New York.

P Jan2-1y

TAKES on sight. The best and best combination for *Canvassers, Agents and Salesmen!*—HENRY WARD BEECHER'S family newspaper starts its fall campaign, giving subscribers a PAIR of the largest and finest OLEOGRAPHS,—two most attractive subjects that "take" *on sight*—painted by Mrs. Anderson, as contrasts and companions for her "*Wide Awake*" and "*Fast Asleep.*" Agents have *immense success*; call it the "best business ever offered canvassers." We furnish the lightest and handsomest outfit and pay very high commissions. Each subscriber, old or new, receives WITHOUT DELAY, two beautiful pictures, full supply ready for *immediate delivery*. The paper itself stands peerless among family journals, being so popular that of its class it has the *largest circulation in the world!* Employs the best literary talent. Edward Eggleston's serial story is just beginning; back chapters supplied to each subscriber. Mrs. Stowe's long expected sequel to "*My Wife and I*" begins in the new year. Any one wishing a good salary, or an independent business, should send for circulars and terms to J. B. FORD & CO., **AGENTS WANTED.** New York, Boston, Chicago, Cincinnati or San Francisco.

MISCELLANEOUS.

BLAKE'S STONE AND ORE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery. Also to break stone for McAdam roads, and Ballasting Railroads.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application by letter to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

☞ Those who visit New York City can be shown this machine in operation at 137 Elm street, where M. B. WASHBURN will give information, prices, &c., and receive orders.

Mch. 14-1y. **Address BLAKE CRUSHER COMPANY, New Haven, Conn.**

MISCELLANEOUS.

IRVING A. STEARNS,

MINING AND CIVIL ENGINEER,

Wilkesbarre, Penn'a.

Examines and Surveys Mines and Mineral Properties.

Furnishes Working plans and Estimates for mines, improvements, and superintends the establishment and working of mines. Dec. 16-tf

---

RICHARD P. ROTHWELL,

MINING ENGINEER,

ROOMS 107, 108, 109,

71 Broadway, New York.

COAL AND IRON A SPECIALITY.

P. O. Box 2487 N. Y.

THOMAS M. DROWN,

ANALYTICAL CHEMIST

AND

CONSULTING METALLURGIST

1123 GIRARD STREET,

PHILADELPHIA.

EDWARD SAMUEL,

Iron Broker and Commission Merchant,

332 WALNUT STREET, PHILADELPHIA.

Solicits consignments and orders to purchase or sell American or Foreign Raw or Manufactured Irons.

Dec, 31:tf

ISIDOR WALZ, Ph.D.

ANALYTICAL AND CONSULTING CHEMIST

No. 18 EXCHANGE PLACE

NEW YORK.

WOOD ENGRAVING

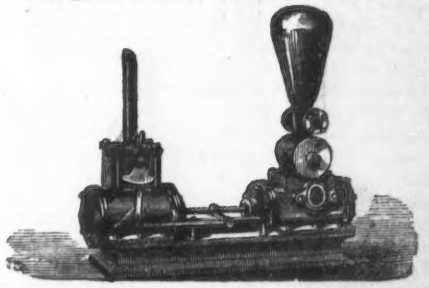
EXECUTED AT THE OFFICE OF

The Engineering and Mining Journal

27 PARK PLACE, NEW YORK CITY.

STEAM PUMPS.

Niagara Steam Pump Works.



This Pump has taken the first premium at every Fair in the United States where there has been a practical test.

CHARLES B. HARDICK,

No. 23 ADAMS STREET, BROOKLYN, N. Y.,

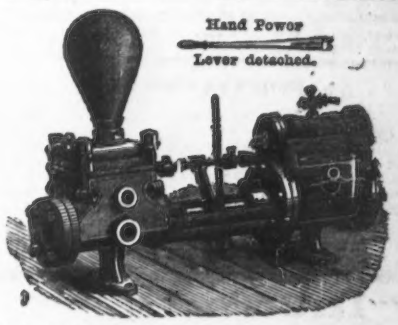
Sole Manufacturer of

HARDICK'S PATENT DOUBLE-ACTING

STEAM PUMPS AND FIRE ENGINES,

Patented in England, Belgium and France. Send for circular. feb-13-1y

---



GEO. F. BLAKE & CO.,

MANUFACTURERS OF BLAKE'S PATENT

STEAM PUMPS.

No. 79 LIBERTY STREET, NEW YORK.

Factory 51 Chardon St., Boston, Mass.

A specialty made of the manufacture of DOUBLE-ACTING PLUNGER PUMPS for mining purposes—combining economy of space, capacity, and great durability. All wearing parts made of composition metal.

Also, Boiler Feed Pumps, Fire Pumps, Tank Pumps, Wrecking Pumps, etc., etc.

Send for Illustrated Price Circular. m-26-3m.

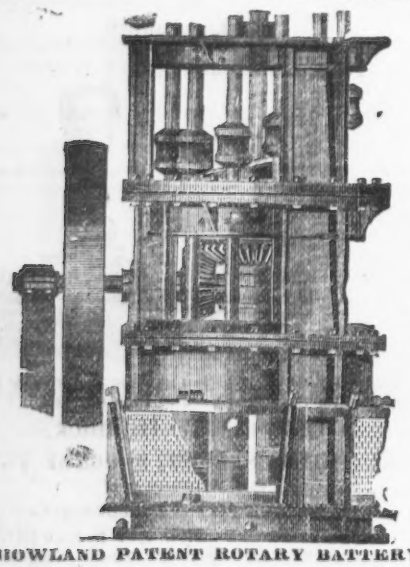
ENGINES, IRON WORK, ETC.

NASON'S VERTICAL TUBE RADIATORS

IN VARIOUS SIZES AND PATTERNS

JOSEPH NASON & CO., 61 BEEKMAN ST., corner of Gold street.—WROUGHT and CAST-IRON PIPES; all kinds of STEAM and GAS FITTINGS; Apparatus for WARMING and VENTILATING BUILDINGS.
JOSEPH NASON. HENRY R. WORTHINGTON.
nov29-1y

MINING MACHINERY, ETC.



HOWLAND PATENT ROTARY BATTERY

of 12 stamps. It requires no frame to put it up. The best Battery ever used for amalgamating gold, or crushing silver ores, dry or wet. Can be put up on a mine in running order for one-half the price of the straight battery, and in three days after its arrival at the mine. 12-stamp battery, 20,000 pounds, with frame complete; 6-stamp battery, 7,000 pounds. Every mill run at shop before shipping.

CALIFORNIA STAMP MILLS,

All the various styles of Pans, Amalgamators, Rock Breakers, Separators, Settlers, Concentrators, Dry or Wet, for working Gold, Silver or Copper Ores, the same as built in California and at lower prices. SHOES AND DIES made of the best white iron. Send sizes and we will make patterns and forward Shoes and Dies at low prices. Engines, Boilers and fixtures, and other Machinery made to order.

☞ Send for a Circular.
Address MOREY & SPERRY,
Jan 6:6m 95 Liberty Street New-York.

"IRON" (WITH WHICH IS INCORPORATED the MECHANIC'S MAGAZINE, a Journal of Science, Metals, Patents and Manufactures, Engineering, Building, Railways, Telegraphy, Shipbuilding, Factory News, etc., etc.

Subscription, 36 s. per annum, post paid.

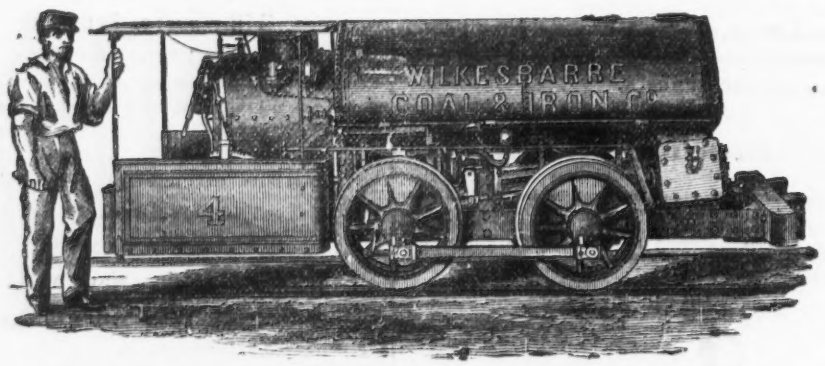
May be had of all Newsvenders and from the offices 90 Cannon street, London, England.

MAYNARD & VAN RENSSELAER,
Mining and Metallurgical Engineers,
Experts in Iron, Analytical Chemists,
24 Cliff Street, New York.
GEO. W. MAYNARD, SCHUYLER VAN RENSSELAER.

MISCELLANEOUS.

STURTEVANT
Pressure Blowers, Fan Blowers and Exhaust Fans.
10,000 Sold in Six Years
Send for Illustrated Catalogue.
B. F. STURTEVANT, 72 Sudbury Street,
BOSTON, MASS.

LEHIGH ZINC COMPANY.
JORDON MONGES, Treasurer. B. C. WEBSTER, President.
WORKS, BETHLEHEM, PA. OFFICE, 333 Walnut Street. Philadelphia
JOHN JEWETT & SONS, AGENTS, 182 FRONT STREET. NEW YORK.
OXIDE OF ZINC, SPELTER, SHEET ZINC.
Jun28:1y SPIEGELEISEN CINDER FOR BLAST FURNACES.



IMPROVED DIRECT-ACTING MINING LOCOMOTIVE

Gauge, two feet six inches or upwards; Hight above rail, five feet four inches; Width over all, five feet one inch. Adapte to burn Anthracite or Bituminous coal or coke.

Materials and Workmanship Equal to those in Full Gauge Railroad Locomotives,

Guaranteed to pass curves of twenty-five feet radius and haul on a level track in good condition.
Three Hundred and Forty Gross Tons of Cars and Load.
For Photograph and full particulars, address BURNHAM, PARRY, WILLIAMS & CO.
Feb 7-1y:eow Baldwin Locomotive Works, Philadelphia.

The Pulsometer.

The simplest, most durable and effective Steam Pump now in use. Will pump gritty or muddy water without wear or injury to its parts. It cannot get out of order.

BRANCH DEPOTS:
11 Pemberton Square, Boston.
1327 Market street, Philadelphia.
59 Wells street, Chicago.
South Western Exposition, New Orleans.
811 and 813 North Second street, St. Louis.

C. HENRY HALL & CO.,
20 Cortlandt Street, New York.

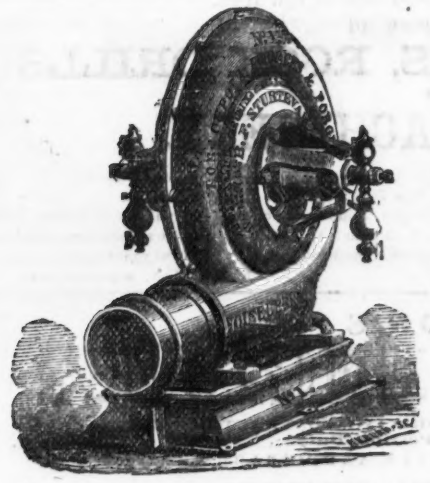
"ENGINEERING."

"The leading Engineering Journal of the world," indispensable to every Civil, Mining, or Mechanical Engineer, can now be obtained post-paid at $9 30 currency, by remitting Post Office order to NEW YORK OFFICE "ENGINEERING," 52 Broadway.

JOLIET IRON AND STEEL COMPANY,
MANUFACTURERS OF
PIG METAL, RAILROAD IRON
AND
BESSEMER STEEL RAILS.
Works at Joliet, Ill.
Office, 94 Washington street, Chicago.
A. B. MEEKER, Pres.
june10:6m J. H. WRENN, Treas. and Sec.

W. B. COGSWELL,
Civil & Mechanical Engineer.
SPECIALITY:
Blast Furnace Construction.
P. O. Address
Franklin Iron Works,
Oneida County,
Nov. 19:1y N. Y.

MACHINISTS' SUPPLIES



B F. STURTEVANT'S

PATENT IMPROVED

PRESSURE BLOWER,

FOR CUPOLA FURNACES AND FORGES.

Also manufacturer of the Sturtevant Patent Improved Fan Blower and Exhaust Fan. Send for illustrated catalogue.
B. F. STURTEVANT, 72 Sudbury street, Boston, Mass.
n29:1y

KROM'S PATENT DRY-ORE
CONCENTRATOR
AND COMPLETE MACHINERY
FOR CRUSHING SCREENING
AND CONCENTRATING ORES.

Minerals and Ores in which the difference of specific gravity is so slight and which are also sometimes in such fine particles as to defy separation by any other machinery or method, are rapidly separated by this Concentrator.

Mr. W. Bement, of Georgetown, Col., concentrating Silver ores, says: "I am satisfied your machines can not be beaten; they are simple, require no power (comparatively,) and do not get out of order."

A comparison is challenged between the results obtained by the approved methods of water concentration and the complete system of dry-ore concentration in the amount of ore saved, quantity concentrated, economy of working, and comfort of the operators and workmen.

Parties interested in mining are invited to call at No. 210 Eldridge street, New York, where they may see a machine in operation and have samples of their own ores crushed and concentrated.

For information and circulars, apply to

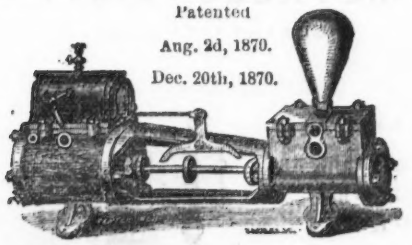
S. R. KROM,
No. 210 Eldridge Street, New York City.

THE SELDEN DIRECT-ACTING

STEAM PUMP

A. CARR, Manufacturer & Proprietor.

Patented
Aug. 2d, 1870.
Dec. 20th, 1870.



Combining simplicity and durability to a remarkable degree. Its parts are easy of access, and it is adapted to ALL PURPOSES for which Steam Pumps are used.

AS A MINING PUMP

It is unsurpassed. Also,

Steam, Gas and Water Pipe, Brass Work. Steam and Water Gauges, Fittings, etc. etc.

CARR PATENT STEAM RADIATOR.

Send for Price-List and Circulars.

Address A. CARR,
feb15.72:24 343 Courtlandt Street, New York.

COAL SHIPPERS.

SAM'L BONNELL, JR.,
OFFERS FOR SALE
HONEY BROOK,
CROSS CREEK,
and UPPER LEHIGH,
LEHIGH COALS.
ALSO,
RED AND WHITE ASH
WYOMING,
Delivered on board Vessels at Elizabethport, New Jersey.

OFFICE, 43 AND 45 TRINITY BUILDING.
Dec. 23-f

WILKESBARRE COAL,
DELIVERED DIRECT FROM THE MINES OF
THE WILKESBARRE COAL AND IRON COMPANY,
OR FOR RE-SHIPMENT AT
Port Johnston and Hoboken.

OFFICE, 80 BROADWAY, NEW YORK.
Dec. 23-tf

PITTSTON COAL.

C. A. BLAKE & Co.,
Miners and Shippers of
Pittston, Lackawanna,
WYOMING VALLEY,
and LEHIGH COAL,

Offices, No. 111 BROADWAY, NEW YORK,
7 Commercial Block, Buffalo, N. Y., and
Opposite Erie R. R. Depot, Waverly, N. Y.
Dec. 16-tf

LACKAWANNA COAL.

STEPHEN S. LEE & SON,
Miners and Shippers of
GEORGE'S CREEK COAL.
SWANTON MINES,
No. 49 West Lombard street,
may23-tf BALTIMORE.

MARYLAND COAL CO.,
Miners and Shippers of the best George's Creek Cumberland Coal.
Office No. 12 Trinity Building.
W. W. BRAMHALL, Secretary & Treasurer.
A. CHAMBERLIN, President.
jan23.1y JOHN K. SHAW, Vice President.

THE DESPARD COAL COMPANY OFFER THEIR Superior DESPARD COAL to Gas Light Companies throughout the country.
MINES IN HARRISON COUNTY, West Virginia.
Wharves, Locust Point, } Baltimore.
Company's Office, No. 29 South st. }
AGENTS:
PARMELEE BROTHERS, No. 32 Pine street, New York. BANGS & HORTON, No. 31 Doane street, Boston.
Among the consumers of Despard Coal we name Manhattan Gas Light Co, New York; Metropolitan Gas Light Co., New York; Jersey City Gas Light Co., Jersey City, N. J.; Washington Gas Light Co., Washington, D. C. Portland Gas Light Co. Portland, Maine.
☞ Reference to them is requested. may30-1y

COXE BRO.'S & CO., CROSS CREEK COLLIERY, MINers and Shippers of the Celebrated
Cross Creek Free Burning Lehigh Red Ash
COAL.
FROM THE BUCK MOUNTAIN VEIN.
OFFICES;
Philadelphia, No. 206 South Fourth street.
Drifton, Jeddo P. O., Luzerne Co., Pa.
Agent in New York, SAMUEL BONNELL, Jr.,
Room 43, Trinity Building,
feb-1 111 Broadway

COAL SHIPPERS

THE NEWBURGH ORREL COAL COMPANY
Mines at Newburgh, Preston Co., W. Va.
Company's Office, No. 52 S. Gay St. Baltimore, Md.
C. OLIVER O'DONNELL.....President.
CHAS. MACKALL.....Secretary
This Company offer their very superior Gas Coal at lowest market prices.
It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.
It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.
The best dry coals shipped, and the promptest attention given to orders. sep21-1y

Philadelphia and Reading
COAL & IRON CO.
OFFICE, No. 9 PINE STREET.
E. A. QUINTARD, Agent.
NEW YORK, March, 1873.
OFFER
Hard and Free Burning White Ash Coals.
Schuylkill Red Ash,
Alaska Red Ash,
Shamokin White Ash,
Shamokin Red Ash,
North Franklin,
Lorberry, and
Lykens Valley Coal,
ON BOARD, AT PORT RICHMOND,
PHILADELPHIA,
OR
DELIVERED IN NEW YORK,
AND AT
ALL PORTS ALONG THE SOUND AND HUDSON RIVER.
Circulars of Prices will be issued on the 20th of each month.

DETMOLD & COX,
ANTHRACITE AND BITUMINOUS
COALS.
Office, 40 Trinity Building, New York. jan22-1y

JOHN WHITE,
MINER AND SHIPPER OF
McNEAL LEHIGH COAL,
ROOM 49, TRINITY BUILDING,
111 Broadway, N. Y.
Also, Dealer in Pea and Dust Coal.

E. B. BENJAMIN
10 BARCLAY STREET,
NEW YORK CITY,

Importer and Manufacturer of all kinds of apparatus for mineral and chemical analysis. *Laboratory and Assaying Tools, Prospecting and Mining Implements, accurate* Balances and Weights, Furnaces, Tongs, Freiberg Scarifiers, French Cupels and Assay Cups. Flasks, Dippers, *Crucibles*, etc. Complete *Blowpipe* sets for gold and silver tests. Compasses, Becker's Ingot Moulds, Lenses, Evaporators, etc., etc.

For better description of apparatus and prices, see the large *Illustrated Catalogue*, beautifully gotten up, in cloth,

Price - $1 50 per Copy.
1y-apr8-73

SCHOOL OF MINES, COLUMBIA COLLEGE.
FACULTY.—F. A. P. BARNARD, S.T.D., LL.D., PRESIDENT, T. EGLESTON, JR., E. M., Mineralogy and Metallurgy; F. L. VINTON, E. M., Civil and Mining Engineer; C. F. CHANDLER, PH. D., Analytical and Applied Chemistry; JOHN TORREY, M.D., LL.D., Botany; C. A. JOY, PH. D., General Chemistry, W. G. PECK, LL.D., Mechanics; J. H. VAN AMRINGE, A.M., Mathematics; O. N. ROOD, A.M., Physics; J. S. NEWBERRY, M.D. LL.D., Geology and Paleontology. Regular courses in Civil and Mining Engineering; Metallurgy; Geology and Natural History; Analytical and Applied Chemistry. Special students received for any of the branches taught. Particular attention paid to Assaying. For further information and catalogues, apply to
DR. C. F. CHANDLER,
Nov. 21:1y Dean of the Faculty.

Advertisements.

Advertisements admitted on this page at the rate of **40** *cents per line. Engravings may head advertisements at the same rate per line, by measurement, as the letter press.*

WM. A. SWEET, Pres't. GEO. W. HARWOOD, Treas. FRED. B. CHAPMAN, Sec'y.

SWEET'S MANUFACTURING CO.,

SYRACUSE, N. Y.,

MANIPULATORS OF

Bessemer Steel,
Siemens Martin Steel,
Cast Steel,
Blister Steel,

MANUFACTURERS OF

Sweet's Cast Steel Crow Bars,
Sweet's Cast Steel R. R. Bars,
Sweet's Oil-tempered Seat Springs,
Sweet's Excelsior Steel Tire,
Swede's Spring Steel,
Cast Spring Steel,
English Spring Steel,
Sleigh Shoe Steel,
Cutter Shoe Steel,
Frog Point Steel.

Nov 19:1y

RAILROAD IRON FOR MINES.

Stock Constantly on Hand, of any weight and pattern, and sold in lots, to suit purchasers.
Chairs, Spikes, and Fish Joints for same.

For Sale BY DANA & COMPANY, (P. O. Box 5490.) 18 WILLIAM STREET, NEW YORK.

Light Locomotives for use in Collieries, Mines, etc.

march 5 1y

United Royal Smelting Works

OF THE

Kingdoms of Prussia and Saxony.

GENERAL AGENCY:

R. J. ROBERTSON, HAMBURG, GERMANY.

REPRESENTATIVE FOR THE UNITED STATES:

H. ROBERTSON, 149 BROADWAY, NEW YORK

During a temporary absence of Mr. H. ROBERTSON, and until further notice, all communications should be addressed to

R. J. ROBERTSON,
Hamburg, Germany.

COOPER'S GLUE AND REFINED GELATINE

COOPER, HEWITT & CO.,

NO. 17 BURLING SLIP, NEW YORK.

Bar Iron, Braziers' Rods, Wire Rods, Rivet and Machinery Iron, Iron and Steel Wire of all Kinds, Copperas, &c., &c.

RAILROAD IRON, COOPER WROUGHT IRON BEAMS AND GIRDERS,

Martin Cast-Steel, Gun-Barrel and Component Iron,

PUDDLED AND REFINED CHARCOAL BLOOMS,

Ringwood Anthracite and Charcoal Pig Iron

Works at Trenton and Ringwood, N. J.

may 17:1y

RAND & WARING DRILL AND COMPRESSOR CO.,

21 PARK ROW, OPPOSITE NEW POST OFFICE, NEW YORK.

Manufacturers of

AIR COMPRESSORS, ROCK DRILLS AND HOISTING MACHINERY.

LIMA, Peru, May 20th, 1873.

MESSRS. RAND & WARING, Drill and Compressor Co., 21 Park Row, New York:

GENTLEMEN.—The patent rings that you have just sent out for your compressors on the Lima and Oroya Railway were the only things wanted to make the compressors a complete success, although they have given entire satisfaction as first set up. Several gentlemen in this place who are competent to judge of such matters speak very highly of your compressors.

Yours, etc., WM. WISEMAN, Superintendent.

BACON'S HOISTING ENGINES.

FOR MINES, BLAST FURNACES, PILE DRIVING, CONTRACTORS' USE, &c.
Adapted to Every Possible Duty.
COMPACT, STRONG, SIMPLE AND DURABLE.

Manufactured by THE SPEEDWELL IRON WORKS,

OFFICE AND WAREROOM .....36 CORTLAND STREET, N. Y.
WORKS.....MORRISTOWN, N. J. jl 15:tf

THE WIRE TRAMWAY CO.

The CHEAPEST and BEST method for transporting Coals, Minerals, Farm Produce, Sugar Cane, &c., &c.
No Grading or Bridging Required, is not affected by Floods or Snow. Capacity from 50 to 1000 tons per day.
STEPHENS BROS. & CO, Sole Agents for the United States,
187 Broadway, New York City.

Diamond-Pointed STEAM DRILLS.

Recent improvements in connection with the celebrated LESCHOT'S patents have increased the adaptability of these drills to every variety of ROCK DRILLING. Their use, both in this country and in Europe, has sufficiently established their reputation for efficiency and economy, over any other now before the public.

The Drills are built of various sizes and patterns, WITH and WITHOUT BOILERS, and bore at a uniform rate of THREE TO FIVE INCHES PER MINUTE in hard rock.

They are adapted to CHANNELLING, GADDING, SHAFTING, TUNNELLING and open cut work; also to DEEP BORING for TESTING THE VALUE OF MINES and QUARRIES. TEST ORES taken out, show the character of mines at any depth. Used either with steam or compressed air. Simple and durable in construction and never need sharpening.

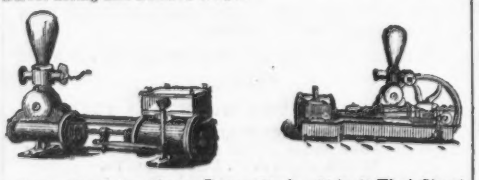
Manufactured by
THE AMERICAN DIAMOND DRILL CO.,
No. 61 Liberty street,
feb4:6m. New York.

THE ONE-PLUNGER JIG

Separates in one and the same operation—1. galena and sulphide of silver; 2. pyrites or blende; 3. tailings, containing no valuable parts; or, 1. gold; 2. pyrites; 3. tailings (quartz, etc.) containing no valuable parts; or, 1. copper, 2. pyrites; 3. tailings containing no valuable parts. The One-Plunger Jig can be combined with existing stamp-mills with highly important advantages. It concentrates all fine metal ores to such cleanness that low grade ores can be shipped, after concentration, as first-class ores. Its feed and discharge are automatic. Its construction offers better guarantee against loss than any other apparatus in use. For particulars, apply to the inventor **F. CAZIN**, Mining and Civil Engineer, Golconda, Pope County, Ill. Dec. 9:1y

GUILD & GARRISON.

manufacturers of Steam Pumps for all purposes, both Direct-acting and Balance-Wheel.



For sale at the Steam Pump Works, 34 to 44 First Street Williamsburg, N. Y. 1y

SUPERIOR RAIL MILL.—CAPACITY: 1,000 TONS PER WEEK.

Harbaugh, Mathias and Owens

Manufacturers of

RAILROAD IRON,

Office, corner Fifth Avenue and Smithfield Street, Pittsburgh.

Our central location enables us to draw from both sides of the Allegheny Mountains Metals and Ores best adapted for making a No. 1 Rail, and together with our Improved Machinery, are a sufficient guarantee of our ability to produce Rails of a quality unsurpassed for durability and strength, by any foreign or domestic manufacture.

New Patterns, of any desirable weight, made to order on Short Notice.

We respectfully solicit orders for New Rails, or Re-rolling. June 26.1y

ELLSWORTH DAGGETT,

MINING ENGINEER

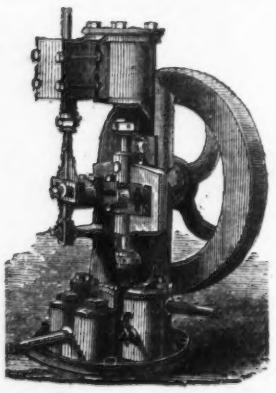
AND

METALLURGIST.

SALT LAKE CITY, UTAH.

June 24 3m

J. CLAYTON'S
Patent Crank and Fly Wheel UPRIGHT PUMP,



Strong, Durable, and well made, a Doub e-Acting

Steam Pump.

Price only $95.

JAMES CLAYTON,
14 Water st.,
Brooklyn, N. Y.
Nov18-tf